FCC PART 15.407

TEST REPORT

For

SZ DJI TECHNOLOGY CO., LTD

14th floor, West Wing, Skyworth Semiconductor Design Building NO.18 Gaoxin South 4th Ave, Nanshan, Shenzhen, Guangdong, China

FCC ID: SS3-MM1A1702

Report Type:	Product Name:
Original Report	Spark

Test Engineer:	*Kevin Hu*
Report Number:	RDG170226002C
Report Date:	2017-03-22
Reviewed By:	Henry Ding EMC Leader
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Chengdu) No.5040, Huilongwan Plaza, No.1, Shawan Road, Jinniu District, Chengdu, Sichuan, China Tel: 028-65523123, Fax: 028-65525125 www.baclcorp.com

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The ***SZ DJI TECHNOLOGY CO., LTD***'s product, model number: ***MM1A*** ***(FCC ID: SS3-MM1A1702)*** (the "EUT") in this report was a ***Spark,*** which was measured approximately: 14.3 cm (L) × 14.3 cm (W) × 5.3 cm (H), rated input voltage: DC11.4V from battery or DC5V charging from adapter.

Adapter information:
MODEL: QC18-EU
INPUT: 100-240V~50/60HZ, 0.5A
OUTPUT: DC5V, 3A/DC9V, 2A/DC12V, 1.5A

**All measurement and test data in this report was gathered from final production sample, serial number: 170226002 (assigned by the BACL, Chengdu). It may have deviation from any other sample.The EUT supplied by the applicant was received on 2017-02-26, and EUT conformed to test requirement.*

Objective

This type approval report is prepared on behalf of ***SZ DJI TECHNOLOGY CO., LTD*** in accordance with Part 2-Subpart J, Part 15-Subparts A, and E of the Federal Communications Commission's rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart E, section 15.203, 15.205, 15.207, 15.209 and 15.407 rules.

Related Submittal(s)/Grant(s)

FCC Part 15B JBP submissions with FCC ID: SS3-MM1A1702.
FCC Part 15C DTS submissions with FCC ID: SS3-MM1A1702.
Part of system submissions with FCC ID: SS3-GL100A1704.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

All emissions measurement was performed and Bay Area Compliance Laboratories Corp. (Chengdu). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement Uncertainty

Parameter	Measurement Uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±0.62dB
Power Spectral Density, conducted	±0.62 dB
Unwanted Emissions, radiated	30M~200MHz: 4.7 dB for Horizontal, 4.7 dB for Vertical 200M~1GHz:6.0 dB for Horizontal, 6.0 for Vertical 1G~6GHz: 5.13 dB, 6G~18GHz: 5.47 dB
Temperature	±1℃
Humidity	±5%
DC and low frequency voltages	±0.4%
Duty Cycle	1%
AC Power Lines Conducted Emission	3.17 dB (150 kHz to 30 MHz)

Test Facility

The test site used by BACL to collect test data is located in the No.5040, Huilongwan Plaza, No.1, Shawan Road, Jinniu District, Chengdu, Sichuan, China

Test site at BACL has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on April 24, 2015. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.:560332. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The EUT was configured for testing in an engineering mode which was provided by the manufacturer.

For 5725~5850MHz band, 802.11a and n ht20 modes, 5 channels are provided for testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
149	5745	161	5805
153	5765	165	5825
157	5785	/	/

Channel 149, 157 and 165 were tested.

For 5 MHz modes, 17 channels are provided for testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	5745	7	5775	13	5805
2	5750	8	5780	14	5810
3	5755	9	5785	15	5815
4	5760	10	5790	16	5820
5	5765	11	5795	17	5825
6	5770	12	5800	/	/

Channel 1, 9 and 17 were tested.

EUT Exercise Software

The software “DJI-RF Certification” was used for testing, which was provided by manufacturer. The worst-case data rates are determined to be as follows for each mode based upon investigations by measuring the average power and PSD across all date rates bandwidths, and modulations.

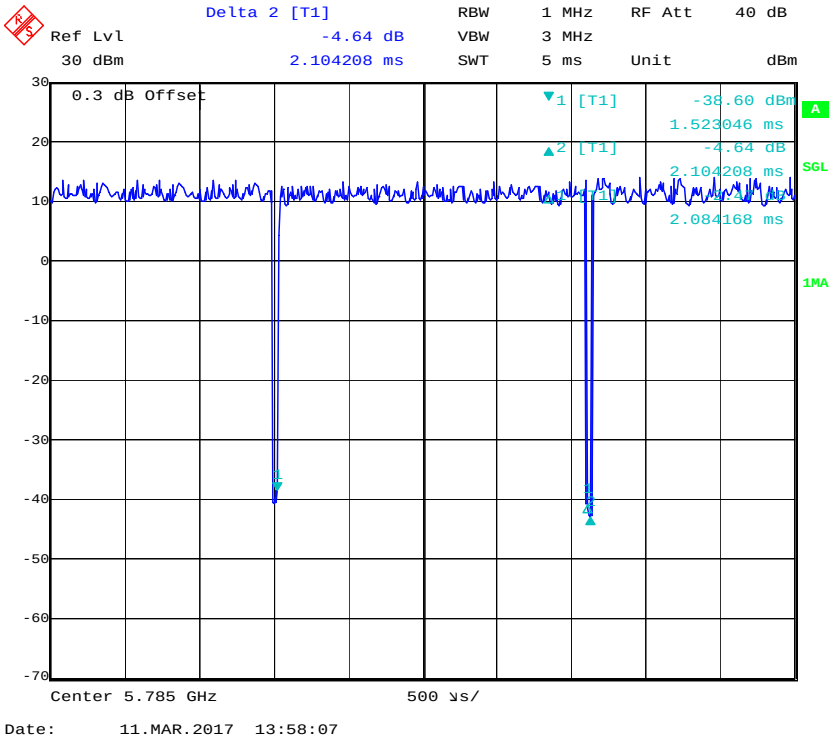
For 802.11a/n ht20 and 5M modes, the maximum power was as below setting, the power setting was provided by the manufacturer:

Test Mode	Antenna 0&1			
	Test Software Version	DJI-RF Certification		
802.11a	Test Frequency(MHz)	5745MHz	5785MHz	5825MHz
	Data Rate	6Mbps	6Mbps	6Mbps
	Power Level Setting	27	27	27
802.11n ht20	Test Frequency(MHz)	5745MHz	5785MHz	5825MHz
	Data Rate	MCS0	MCS0	MCS0
	Power Level Setting	27	27	27
5M	Test Frequency(MHz)	5745MHz	5785MHz	5825MHz
	Power Level Setting	25	25	25

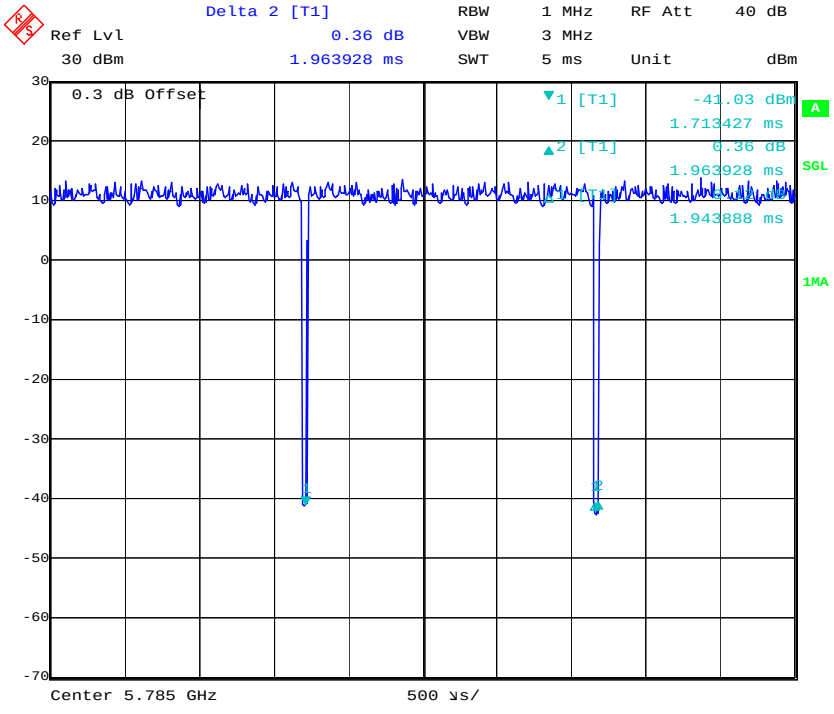
The software configured maximum duty cycle as below:

Mode	T_{on} (ms)	T_{on+off} (ms)	Duty Cycle (%)	Duty Cycle Factor (10*lg(1/x)) (dB)
802.11a	2.084	2.104	99	/
802.11n ht20	1.944	1.964	99	/
5M	1.022	1.743	59	2.32

802.11a mode



802.11n ht20 mode



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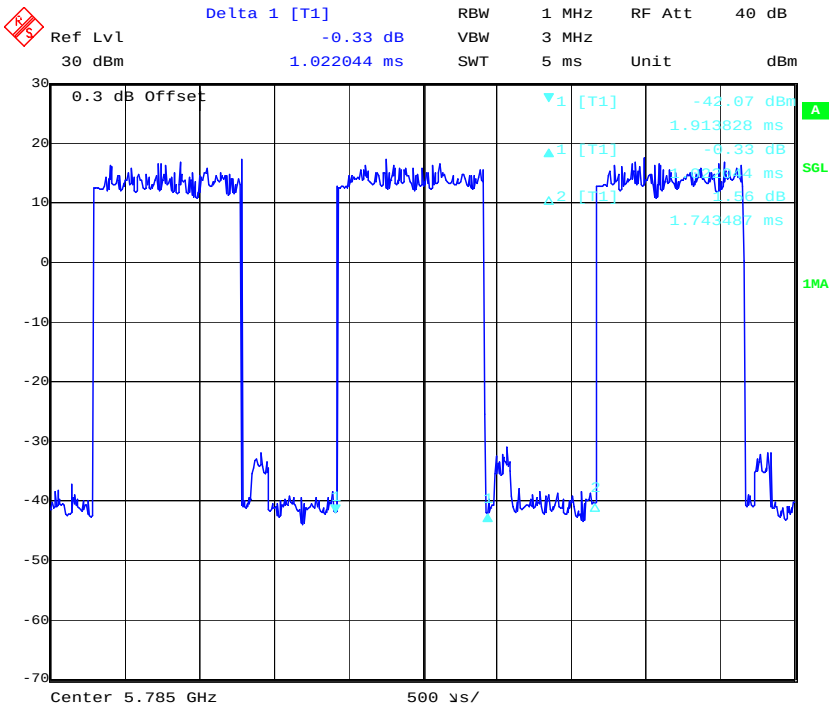
5M mode



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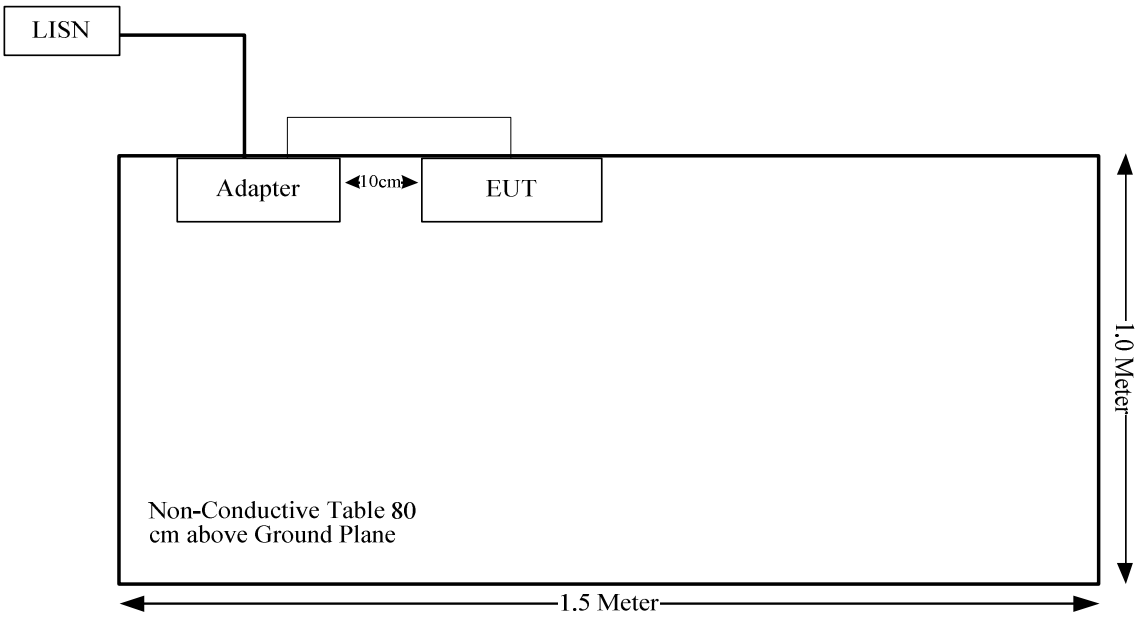
Equipment Modifications

No modification was made to the EUT.

External Cable

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
USB Cable	yes	no	0.8	USB port of Adapter	EUT

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
FCC §15.407 (f) & §1.1310 & §2.1091	Maximum Permissible Exposure (MPE)	Compliance
§15.203	Antenna Requirement	Compliance
§15.407(b)(6)& §15.207(a)	Conducted Emissions	Compliance
§15.205& §15.209 &§15.407(b)	Unwanted Emission	Compliance
§15.407(b)	Out Of Band Emissions	Compliance
§15.407(a)	Emission Bandwidth	Compliance
§15.407(g)	Frequency stability	Compliance
§15.407(a)	Maximum Conducted Output Power	Compliance
§15.407 (a)	Power Spectral Density	Compliance

FCC §15.247 (i) & §1.1310 & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart 15.247(i)and subpart §1.1310, systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

Limits for Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

(B) Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	**Electric Field Strength (V/m)**	**Magnetic Field Strength (A/m)**	**Power Density (mW/cm^2)**	**Averaging Time (minutes)**
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f²)	30
30–300	27.5	0.073	0.2	30
300–1500	/	/	f/1500	30
1500–100,000	/	/	1.0	30

f = frequency in MHz; * = Plane-wave equivalent power density;

According to §1.1310 and §2.1091 RF exposure is calculated.

Calculated Formula:

Prediction of power density at the distance of the applicable MPE limit
$S = PG/4\pi R^2$ = power density (in appropriate units, e.g. mW/cm^2);
P = power input to the antenna (in appropriate units, e.g., mW);
G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain;
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

For simultaneously transmit system, the calculated power density should comply with:

$$\sum_i \frac{S_i}{S_{Limit,i}} \leq 1$$

Calculated Data:

Frequency (MHz)	Antenna Gain		Tune-up Power		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
	(dBi)	(numeric)	(dBm)	(mW)			
2400-2483.5	1.09	1.29	25	316.23	20.00	0.0809	1.0
5725-5850	3.57	2.28	23	199.53	20.00	0.0904	1.0

The 2.4GHz and 5GHz band can`t transmit simultaneously:

Result: The device meet FCC MPE at 20 cm distance

FCC §15.203 – ANTENNA REQUIREMENT

Applicable Standard

According to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.
And according to FCC 47 CFR section 15.407 (a)(1),if transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Antenna Connector Construction

The EUT have two internal antennas. For both antennas, the Maximum gains are 1.09dBi in 2.4GHz band, 3.57dBi in 5.8GHz band, compliance the requirements, Please refer to the EUT photos.

Result: Compliance.

FCC §15.407 (b) (6) §15.207 (a) – CONDUCTED EMISSIONS

Applicable Standard

FCC §15.207(a), §15.407(b) (6).

Measurement Uncertainty

Compliance or non- compliance with a disturbance limit shall be determined in the following manner:

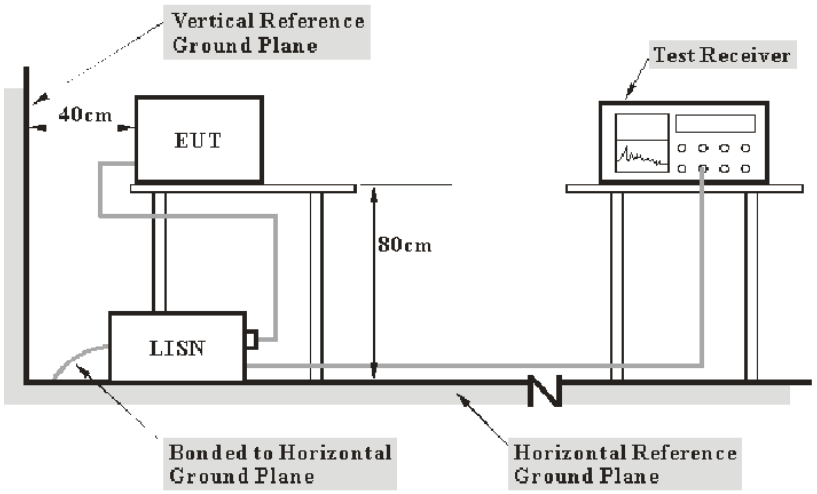
If U_{lab} is less than or equal to U_{cispr} of Table 1, then:
–compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
–non - compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.
If U_{lab} is greater than U_{cispr} of Table 1, then:
–compliance is deemed to occur if no measured disturbance level, increased by (U_{lab} − U_{cispr}), exceeds the disturbance limit;
–non - compliance is deemed to occur if any measured disturbance level, increased by (U_{lab} − U_{cispr}), exceeds the disturbance limit.

Based on CISPR 16-4-2:2011, measurement uncertainty of conducted disturbance at mains port using AMN at Bay Area Compliance Laboratories Corp. (Chengdu) is ±3.17 dB (150 kHz to 30 MHz).

Table 1 – Values of U_{cispr}

Measurement	U_{cispr}
Conducted disturbance at mains port using AMN (150 kHz to 30 MHz)	3.4 dB

EUT Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The spacing between the peripherals was 10 cm.

The adapter was connected to the Main LISN with AC 120 V/60 Hz power

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Corrected Amplitude & Margin Calculation

The basic equation is as follows:

$V_C = V_R + A_C + VDF$
$C_f = A_C + VDF$

Herein,
V_C (cord. Reading): corrected voltage amplitude
V_R: reading voltage amplitude
A_c: attenuation caused by cable loss
VDF: voltage division factor of AMN
C_f: Correction Factor

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of 7dB means the emission is 7dB below the maximum limit. The equation for margin calculation is as follows:

Margin = Limit – Corrected Amplitude

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCS 30	836858/0016	2016-12-02	2017-12-01
Rohde & Schwarz	L.I.S.N.	ENV216	100018	2016-12-02	2017-12-01
Rohde & Schwarz	PULSE LIMITER	ESH3Z2	DE14781	2016-10-31	2017-10-30
N/A	Conducted Cable	NO.5	N/A	2016-11-10	2017-11-09
R&S	Test Software	EMC32	Version8.53.0	N/A	N/A

*** Statement of Traceability:** BACL (Chengdu) attested that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Procedure

During the conducted emission test, the adapter was connected to the first LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.207.

Test Data

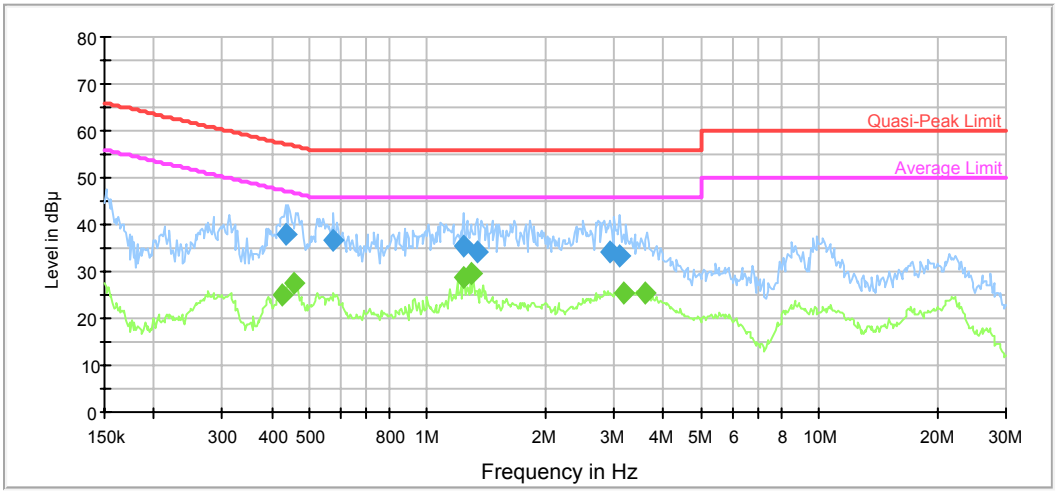
Environmental Conditions

Temperature:	19 °C
Relative Humidity:	56 %
ATM Pressure:	95.6 kPa

The testing was performed by Kevin Hu on 2017-03-08.

Test Mode: Charging

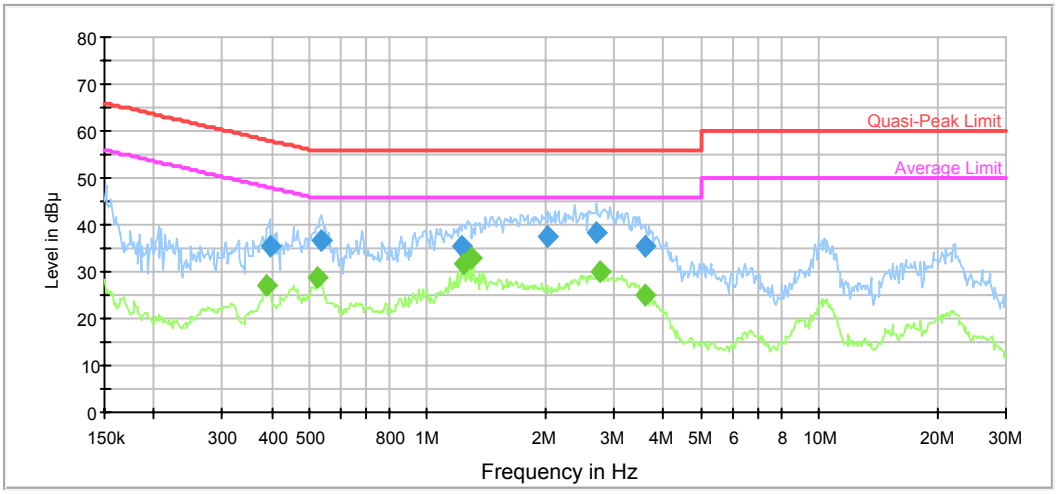
AC120 V, 60 Hz, Line:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.436318	37.9	9.000	L1	19.7	19.2	57.1	Compliance
0.576662	36.5	9.000	L1	19.8	19.5	56.0	Compliance
1.239175	35.4	9.000	L1	19.7	20.6	56.0	Compliance
1.341955	34.2	9.000	L1	19.7	21.8	56.0	Compliance
2.930016	34.0	9.000	L1	19.7	22.0	56.0	Compliance
3.098088	33.5	9.000	L1	19.7	22.5	56.0	Compliance

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.426011	24.9	9.000	L1	19.7	22.4	47.3	Compliance
0.454052	27.5	9.000	L1	19.7	19.3	46.8	Compliance
1.239175	28.8	9.000	L1	19.7	17.2	46.0	Compliance
1.289541	29.6	9.000	L1	19.7	16.4	46.0	Compliance
3.173039	25.4	9.000	L1	19.7	20.6	46.0	Compliance
3.604490	25.3	9.000	L1	19.7	20.7	46.0	Compliance

AC120 V, 60 Hz, Neutral:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.396530	35.5	9.000	N	19.6	22.4	57.9	Compliance
0.536756	36.5	9.000	N	19.6	19.5	56.0	Compliance
1.229340	35.4	9.000	N	19.6	20.6	56.0	Compliance
2.014768	37.6	9.000	N	19.7	18.4	56.0	Compliance
2.705607	38.4	9.000	N	19.7	17.6	56.0	Compliance
3.604490	35.3	9.000	N	19.7	20.7	56.0	Compliance

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.390261	27.2	9.000	N	19.6	20.9	48.1	Compliance
0.524077	28.6	9.000	N	19.6	17.4	46.0	Compliance
1.239175	31.7	9.000	N	19.6	14.3	46.0	Compliance
1.289541	32.9	9.000	N	19.6	13.1	46.0	Compliance
2.749070	30.2	9.000	N	19.7	15.8	46.0	Compliance
3.604490	25.1	9.000	N	19.7	20.9	46.0	Compliance

FCC §15.209, §15.205 & §15.407(b) –UNWANTED EMISSION

Applicable Standard

FCC §15.407; §15.209; §15.205;

(b) Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(2) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(4) For transmitters operating in the 5.725-5.85 GHz band:

(i) All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

(ii) Devices certified before March 2, 2017 with antenna gain greater than 10 dBi may demonstrate compliance with the emission limits in §15.247(d), but manufacturing, marketing and importing of devices certified under this alternative must cease by March 2, 2018. Devices certified before March 2, 2018 with antenna gain of 10 dBi or less may demonstrate compliance with the emission limits in §15.247(d), but manufacturing, marketing and importing of devices certified under this alternative must cease before March 2, 2020.

(5) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.

(6) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207.

(7) The provisions of §15.205 apply to intentional radiators operating under this section.

Measurement Uncertainty

Compliance or non- compliance with a disturbance limit shall be determined in the following manner:

If U_{lab} is less than or equal to U_{cispr} of Table 2, then:
–compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
–non - compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.
If U_{lab} is greater than U_{cispr} of Table 2, then:
–compliance is deemed to occur if no measured disturbance level, increased by ($U_{lab} - U_{cispr}$), exceeds the disturbance limit;
–non - compliance is deemed to occur if any measured disturbance level, increased by ($U_{lab} - U_{cispr}$), exceeds the disturbance limit.

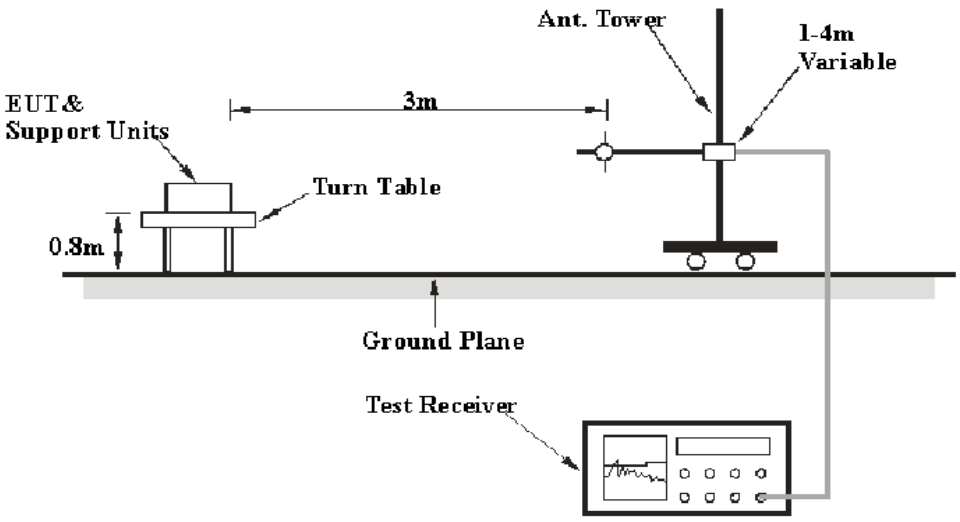
Based on CISPR 16-4-2-2011, measurement uncertainty of radiated emission at a distance of 3m at Bay Area Compliance Laboratories Corp. (Chengdu) is:
30M~200MHz: ±4.7 dB;
200M~1GHz: ±6.0 dB;
1G~6GHz: ±5.13dB;
6G~25GHz: ±5.47 dB;

Table 2 – Values of U_{cispr}

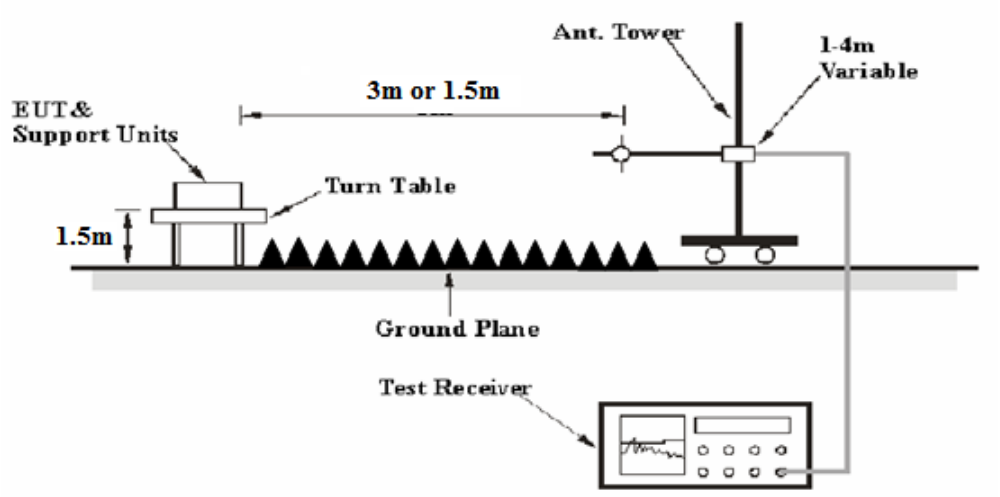
Measurement	U_{cispr}
Radiated disturbance (electric field strength at an OATS or in a SAC) (30 MHz to 1000 MHz)	6.3 dB
Radiated disturbance (electric field strength in a FAR) (1 GHz to 6 GHz)	5.2 dB
Radiated disturbance (electric field strength in a FAR) (6 GHz to 18 GHz)	5.5 dB

EUT Setup

Below 1 GHz:



Above 1 GHz:



The radiated emission tests were performed in the 3 meters chamber, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209, and FCC 15.407 limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 40 GHz.

30MHz-1000MHz:

Detector	RBW	Video B/W	IF B/W
QP	120 kHz	300 kHz	120kHz

1GHz- 25GHz:

Detector	Duty cycle	RBW	Video B/W
PK	Any	1MHz	3 MHz
Ave.	>98%	1MHz	10 Hz
	<98%	1MHz	1/T

Note: T is minimum transmission duration

Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz-1GHz, peak and Average detection modes for frequencies above 1GHz.

According to KDB 789033 D02 General UNII Test Procedures New Rules v01r03, emission shall be computed as: E [dBμV/m] = EIRP[dBm] + 95.2, for d = 3 meters.

According to C63.10, the above 1G test result shall be extrapolated to the specified distance using an extrapolation factor of 20dB/decade from 3m to 1.5m
Distance extrapolation factor =20 log (specific distance [3m]/test distance [1.5m]) dB
Extrapolation result = Corrected Amplitude (dBμV/m) - distance extrapolation factor (6dB)

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Loss and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

Corrected Amplitude = Meter Reading + Antenna Loss + Cable Loss - Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

Margin = Limit –Extrapolation result

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Agilent	Amplifier	8447D	2944A10442	2016-12-02	2017-12-01
Rohde & Schwarz	EMI Test Receiver	ESCI	100028	2016-12-02	2017-12-01
Sunol Sciences	Broadband Antenna	JB3	A121808	2016-04-10	2019-04-09
Rohde & Schwarz	Spectrum Analyzer	FSEM30	100018	2016-12-02	2017-12-01
ETS	Horn Antenna	3115	003-6076	2016-12-02	2017-12-01
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-0113024	2014-06-16	2017-06-15
Mini-circuits	Amplifier	ZVA-183-S+	771001215	2016-05-20	2017-05-19
EMCT	Semi-Anechoic Chamber	966	N/A	2015-04-24	2018-04-23
N/A	RF Cable (below 1GHz)	NO.1	N/A	2016-11-10	2017-11-09
N/A	RF Cable (below 1GHz)	NO.4	N/A	2016-11-10	2017-11-09
N/A	RF Cable (above 1GHz)	NO.2	N/A	2016-11-10	2017-11-09
Ducommun Technolagies	Horn Antenna	ARH-2823-02	1007726-01 1312	2016-08-18	2017-08-18
Quinstar	Amplifier	QLW-18405536-JO	15964001032	2016-08-18	2017-08-18
Agilent	Spectrum Analyzer	8564E	5943A01752	2016-08-18	2017-08-18

*** Statement of Traceability:** BACL (Chengdu) attested that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	19.5 °C
Relative Humidity:	53 %
ATM Pressure:	95.8 kPa

The testing was performed by Kevin Hu on 2017-02-28.

Test Mode: Transmitting

30MHz-40G (For above 1GHz, test performed at 1.5m distance from EUT to antenna)

5725-5850MHz
802.11a mode (2TX was the worst)

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Extrapolation Result dBμV/m	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)						
Low Channel:5745 MHz										
5745	66.53	PK	H	32.59	5.74	0.00	104.86	98.86	N/A	N/A
5745	56.19	AV	H	32.59	5.74	0.00	94.52	88.52	N/A	N/A
5745	74.78	PK	V	32.59	5.74	0.00	113.11	107.11	N/A	N/A
5745	63.63	AV	V	32.59	5.74	0.00	101.96	95.96	N/A	N/A
5725	48.78	PK	V	32.57	5.72	0.00	87.07	81.07	122.20	41.13
5720	35.86	PK	V	32.56	5.71	0.00	74.13	68.13	110.80	42.67
5700	28.01	PK	V	32.54	5.70	0.00	66.25	60.25	105.20	44.95
5650	27.1	PK	V	32.48	5.65	0.00	65.23	59.23	68.20	8.97
11490	35.06	PK	V	37.99	8.22	26.02	55.25	49.25	74.00	24.75
11490	24.34	AV	V	37.99	8.22	26.02	44.53	38.53	54.00	15.47
17235	33.63	PK	V	42.98	10.82	25.99	61.44	55.44	74.00	18.56
17235	22.48	AV	V	42.98	10.82	25.99	50.29	44.29	54.00	9.71
1526	34.34	PK	V	24.14	2.69	26.36	34.81	28.81	74.00	45.19
1526	24.02	AV	V	24.14	2.69	26.36	24.49	18.49	54.00	35.51
4118	33.59	PK	V	29.19	5.00	26.62	41.16	35.16	74.00	38.84
4118	22.32	AV	V	29.19	5.00	26.62	29.89	23.89	54.00	30.11
270.56	43.2	QP	V	13.71	1.30	27.48	30.73	30.73	46.00	15.27
290.93	44.6	QP	V	14.01	1.10	27.53	32.18	32.18	46.00	13.82
Middle Channel:5785 MHz										
5785	66.44	PK	H	32.64	5.77	0.00	104.85	98.85	N/A	N/A
5785	55.53	AV	H	32.64	5.77	0.00	93.94	87.94	N/A	N/A
5785	74.04	PK	V	32.64	5.77	0.00	112.45	106.45	N/A	N/A
5785	62.36	AV	V	32.64	5.77	0.00	100.77	94.77	N/A	N/A
11570	35.04	PK	V	38.03	8.21	26.00	55.28	49.28	74.00	24.72
11570	24.19	AV	V	38.03	8.21	26.00	44.43	38.43	54.00	15.57
17355	33.65	PK	V	43.53	11.03	26.16	62.05	56.05	74.00	17.95
17355	22.93	AV	V	43.53	11.03	26.16	51.33	45.33	54.00	8.67
1569	34.06	PK	V	24.21	2.72	26.40	34.59	28.59	74.00	45.41
1569	22.5	AV	V	24.21	2.72	26.40	23.03	17.03	54.00	36.97
4153	33.35	PK	V	29.24	5.03	26.64	40.98	34.98	74.00	39.02
4153	22.14	AV	V	29.24	5.03	26.64	29.77	23.77	54.00	30.23
270.56	43.3	QP	V	13.71	1.30	27.48	30.83	30.83	46.00	15.17
290.93	44.6	QP	V	14.01	1.10	27.53	32.18	32.18	46.00	13.82

High Channel:5825 MHz										
5825	66.8	PK	H	32.69	5.81	0.00	105.30	99.30	N/A	N/A
5825	55.01	AV	H	32.69	5.81	0.00	93.51	87.51	N/A	N/A
5825	72.13	PK	V	32.69	5.81	0.00	110.63	104.63	N/A	N/A
5825	60.74	AV	V	32.69	5.81	0.00	99.24	93.24	N/A	N/A
5850	35.07	PK	V	32.72	5.83	0.00	73.62	67.62	122.20	54.58
5855	31.46	PK	V	32.73	5.83	0.00	70.02	64.02	110.80	46.78
5875	26.98	PK	V	32.75	5.85	0.00	65.58	59.58	105.20	45.62
5925	26.8	PK	V	32.81	5.89	0.00	65.50	59.50	68.20	8.70
11650	35.45	PK	V	38.06	8.20	25.98	55.73	49.73	74.00	24.27
11650	23.9	AV	V	38.06	8.20	25.98	44.18	38.18	54.00	15.82
17475	33.69	PK	V	44.09	11.23	26.33	62.68	56.68	74.00	17.32
17475	23.03	AV	V	44.09	11.23	26.33	52.02	46.02	54.00	7.98
1608	34.42	PK	V	24.27	2.75	26.44	35.00	29.00	74.00	45.00
1608	23.29	AV	V	24.27	2.75	26.44	23.87	17.87	54.00	36.13
4205	33.14	PK	V	29.33	5.06	26.67	40.86	34.86	74.00	39.14
4205	22.35	AV	V	29.33	5.06	26.67	30.07	24.07	54.00	29.93
270.56	43.4	QP	V	13.71	1.30	27.48	30.93	30.93	46.00	15.07
290.93	44.6	QP	V	14.01	1.10	27.53	32.18	32.18	46.00	13.82

802.11n ht20 mode (2TX was the worst)

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Extrapolation Result dBμV/m	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)						
Low Channel:5745 MHz										
5745	69.89	PK	H	32.59	5.74	0.00	108.22	102.22	N/A	N/A
5745	57.51	AV	H	32.59	5.74	0.00	95.84	89.84	N/A	N/A
5745	76.53	PK	V	32.59	5.74	0.00	114.86	108.86	N/A	N/A
5745	64.84	AV	V	32.59	5.74	0.00	103.17	97.17	N/A	N/A
5725	49.1	PK	V	32.57	5.72	0.00	87.39	81.39	122.20	40.81
5720	39.61	PK	V	32.56	5.71	0.00	77.88	71.88	110.80	38.92
5700	28.31	PK	V	32.54	5.70	0.00	66.55	60.55	105.20	44.65
5650	26.64	PK	V	32.48	5.65	0.00	64.77	58.77	68.20	9.43
11490	35.68	PK	V	37.99	8.22	26.02	55.87	49.87	74.00	24.13
11490	24.83	AV	V	37.99	8.22	26.02	45.02	39.02	54.00	14.98
17235	33.23	PK	V	42.98	10.82	25.99	61.04	55.04	74.00	18.96
17235	23.17	AV	V	42.98	10.82	25.99	50.98	44.98	54.00	9.02
3152	40.64	PK	V	25.05	3.66	26.46	42.89	36.89	74.00	37.11
3152	30.3	AV	V	25.05	3.66	26.46	32.55	26.55	54.00	27.45
4218	33.51	PK	V	29.35	5.07	26.68	41.25	35.25	74.00	38.75
4218	22.79	AV	V	29.35	5.07	26.68	30.53	24.53	54.00	29.47
270.56	43.4	QP	V	13.71	1.30	27.48	30.93	30.93	46.00	15.07
290.93	44.6	QP	V	14.01	1.10	27.53	32.18	32.18	46.00	13.82
Middle Channel:5785 MHz										
5785	68.97	PK	H	32.64	5.77	0.00	107.38	101.38	N/A	N/A
5785	56.83	AV	H	32.64	5.77	0.00	95.24	89.24	N/A	N/A
5785	75.24	PK	V	32.64	5.77	0.00	113.65	107.65	N/A	N/A
5785	63.14	AV	V	32.64	5.77	0.00	101.55	95.55	N/A	N/A
11570	35.63	PK	V	38.03	8.21	26.00	55.87	49.87	74.00	24.13
11570	24.34	AV	V	38.03	8.21	26.00	44.58	38.58	54.00	15.42
17355	33.61	PK	V	43.53	11.03	26.16	62.01	56.01	74.00	17.99
17355	21.5	AV	V	43.53	11.03	26.16	49.90	43.90	54.00	10.10
1569	34.04	PK	V	24.21	2.72	26.40	34.57	28.57	74.00	45.43
1569	24.09	AV	V	24.21	2.72	26.40	24.62	18.62	54.00	35.38
4153	33.8	PK	V	29.24	5.03	26.64	41.43	35.43	74.00	38.57
4153	22.34	AV	V	29.24	5.03	26.64	29.97	23.97	54.00	30.03
270.56	43	QP	V	13.71	1.30	27.48	30.53	30.53	46.00	15.47
290.93	44.7	QP	V	14.01	1.10	27.53	32.28	32.28	46.00	13.72

High Channel:5825 MHz										
5825	66.29	PK	H	32.69	5.81	0.00	104.79	98.79	N/A	N/A
5825	55.15	AV	H	32.69	5.81	0.00	93.65	87.65	N/A	N/A
5825	73.24	PK	V	32.69	5.81	0.00	111.74	105.74	N/A	N/A
5825	62.36	AV	V	32.69	5.81	0.00	100.86	94.86	N/A	N/A
5850	36.63	PK	V	32.72	5.83	0.00	75.18	69.18	122.20	53.02
5855	30.16	PK	V	32.73	5.83	0.00	68.72	62.72	110.80	48.08
5875	27.49	PK	V	32.75	5.85	0.00	66.09	60.09	105.20	45.11
5925	26.91	PK	V	32.81	5.89	0.00	65.61	59.61	68.20	8.59
11650	36	PK	V	38.06	8.20	25.98	56.28	50.28	74.00	23.72
11650	24.49	AV	V	38.06	8.20	25.98	44.77	38.77	54.00	15.23
17475	33.38	PK	V	44.09	11.23	26.33	62.37	56.37	74.00	17.63
17475	21.9	AV	V	44.09	11.23	26.33	50.89	44.89	54.00	9.11
1608	34.18	PK	V	24.27	2.75	26.44	34.76	28.76	74.00	45.24
1608	23.33	AV	V	24.27	2.75	26.44	23.91	17.91	54.00	36.09
4205	34.19	PK	V	29.33	5.06	26.67	41.91	35.91	74.00	38.09
4205	22.57	AV	V	29.33	5.06	26.67	30.29	24.29	54.00	29.71
270.56	43.2	QP	V	13.71	1.30	27.48	30.73	30.73	46.00	15.27
290.93	44.4	QP	V	14.01	1.10	27.53	31.98	31.98	46.00	14.02

5M(2TX was the worst):

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Extrapolation Result dBμV/m	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector (PK/QP/AV)	Polar (H/V)	Factor (dB)						
Low Channel:5745 MHz										
5745	80.87	PK	H	32.59	5.74	0.00	119.20	113.20	N/A	N/A
5745	67.14	AV	H	32.59	5.74	0.00	105.47	99.47	N/A	N/A
5745	85.41	PK	V	32.59	5.74	0.00	123.74	117.74	N/A	N/A
5745	71.62	AV	V	32.59	5.74	0.00	109.95	103.95	N/A	N/A
5725	29	PK	V	32.57	5.72	0.00	67.29	61.29	122.20	60.91
5720	28.69	PK	V	32.56	5.71	0.00	66.96	60.96	110.80	49.84
5700	28.33	PK	V	32.54	5.70	0.00	66.57	60.57	105.20	44.63
5650	26.81	PK	V	32.48	5.65	0.00	64.94	58.94	68.20	9.26
11490	37.02	PK	V	37.99	8.22	26.02	57.21	51.21	74.00	22.79
11490	25.37	AV	V	37.99	8.22	26.02	45.56	39.56	54.00	14.44
17235	35.8	PK	V	42.98	10.82	25.99	63.61	57.61	74.00	16.39
17235	23.59	AV	V	42.98	10.82	25.99	51.40	45.40	54.00	8.60
2204	37.35	PK	V	24.21	3.03	26.85	37.74	31.74	74.00	42.26
2204	25.1	AV	V	24.21	3.03	26.85	25.49	19.49	54.00	34.51
3516	36.9	PK	V	27.06	4.20	26.59	41.57	35.57	74.00	38.43
3516	24.73	AV	V	27.06	4.20	26.59	29.40	23.40	54.00	30.60
314.21	45.1	QP	V	14.46	1.17	27.59	33.14	33.14	46.00	12.86
540.22	37	QP	V	18.50	1.71	28.83	28.38	28.38	46.00	17.62
Middle Channel:5785 MHz										
5785	80.67	PK	H	32.64	5.77	0.00	119.08	113.08	N/A	N/A
5785	66.61	AV	H	32.64	5.77	0.00	105.02	99.02	N/A	N/A
5785	85.63	PK	V	32.64	5.77	0.00	124.04	118.04	N/A	N/A
5785	71.96	AV	V	32.64	5.77	0.00	110.37	104.37	N/A	N/A
11570	37.6	PK	V	38.03	8.21	26.00	57.84	51.84	74.00	22.16
11570	24.99	AV	V	38.03	8.21	26.00	45.23	39.23	54.00	14.77
17355	35.56	PK	V	43.53	11.03	26.16	63.96	57.96	74.00	16.04
17355	23.1	AV	V	43.53	11.03	26.16	51.50	45.50	54.00	8.50
2243	37.48	PK	V	24.07	3.02	26.85	37.72	31.72	74.00	42.28
2243	25.18	AV	V	24.07	3.02	26.85	25.42	19.42	54.00	34.58
3548	36.44	PK	V	27.19	4.25	26.59	41.29	35.29	74.00	38.71
3548	24.73	AV	V	27.19	4.25	26.59	29.58	23.58	54.00	30.42
314.21	44.8	QP	V	14.46	1.17	27.59	32.84	32.84	46.00	13.16
540.22	37.2	QP	V	18.50	1.71	28.83	28.58	28.58	46.00	17.42
High Channel:5825 MHz										
5825	80.57	PK	H	32.69	5.81	0.00	119.07	113.07	N/A	N/A
5825	67.98	AV	H	32.69	5.81	0.00	106.48	100.48	N/A	N/A
5825	85.33	PK	V	32.69	5.81	0.00	123.83	117.83	N/A	N/A
5825	71.99	AV	V	32.69	5.81	0.00	110.49	104.49	N/A	N/A
5850	29.58	PK	V	32.72	5.83	0.00	68.13	62.13	122.20	60.07
5855	28.63	PK	V	32.73	5.83	0.00	67.19	61.19	110.80	49.61
5875	28.21	PK	V	32.75	5.85	0.00	66.81	60.81	105.20	44.39
5925	26.6	PK	V	32.81	5.89	0.00	65.30	59.30	68.20	8.90
11650	37.32	PK	V	38.06	8.20	25.98	57.60	51.60	74.00	22.40
11650	25.58	AV	V	38.06	8.20	25.98	45.86	39.86	54.00	14.14
17475	34.63	PK	V	44.09	11.23	26.33	63.62	57.62	74.00	16.38
17475	22.65	AV	V	44.09	11.23	26.33	51.64	45.64	54.00	8.36
2296	37.66	PK	V	23.89	3.01	26.86	37.70	31.70	74.00	42.30
2296	25.52	AV	V	23.89	3.01	26.86	25.56	19.56	54.00	34.44
3583	36.86	PK	V	27.33	4.30	26.58	41.91	35.91	74.00	38.09
3583	24.42	AV	V	27.33	4.30	26.58	29.47	23.47	54.00	30.53
314.21	45.4	QP	V	14.46	1.17	27.59	33.44	33.44	46.00	12.56
540.22	37	QP	V	18.50	1.71	28.83	28.38	28.38	46.00	17.62

FCC §15.407(b)–OUT- OF-BAND EMISSIONS

Applicable Standard

FCC §15.407

(b) Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(2) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(4) For transmitters operating in the 5.725-5.85 GHz band:

(i) All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

(ii) Devices certified before March 2, 2017 with antenna gain greater than 10 dBi may demonstrate compliance with the emission limits in §15.247(d), but manufacturing, marketing and importing of devices certified under this alternative must cease by March 2, 2018. Devices certified before March 2, 2018 with antenna gain of 10 dBi or less may demonstrate compliance with the emission limits in §15.247(d), but manufacturing, marketing and importing of devices certified under this alternative must cease before March 2, 2020.

(5) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.

Test Procedure

According to KDB 789033 D02 General UNII Test Procedures New Rules v01r03

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSEM30	100018	2016-12-02	2017-12-01
N/A	RF Cable	N/A	N/A	Each Time	/
N/A	10dB Attenuator	10dB	10dB-1	Each Time	/
N/A	3dB Attenuator	10dB	3dB-1	Each Time	/

*** Statement of Traceability:** BACL (Chengdu) attested that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	18~18.5 °C
Relative Humidity:	52~54 %
ATM Pressure:	96.2~96.5 kPa

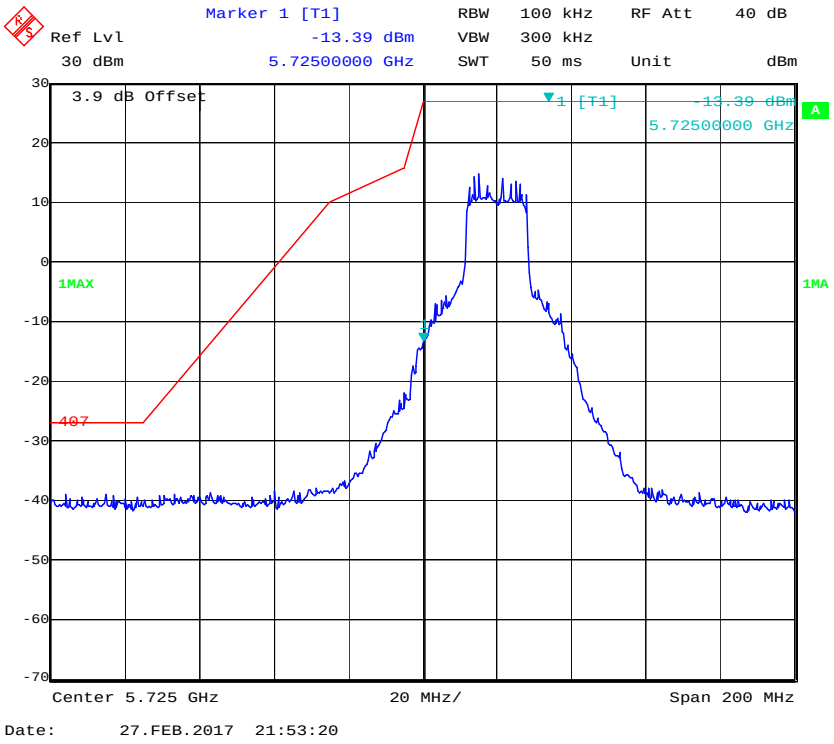
The testing was performed by Kevin Hu on 2017-02-27&2017-03-11.

Test Result: Pass.

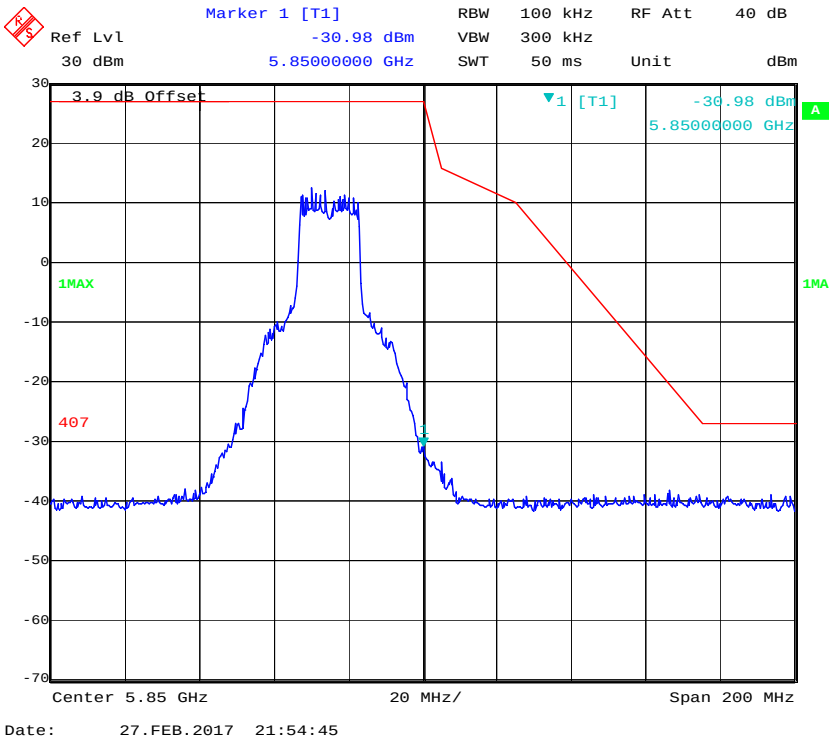
Please refer to the following tables and plots.

Chain 0:

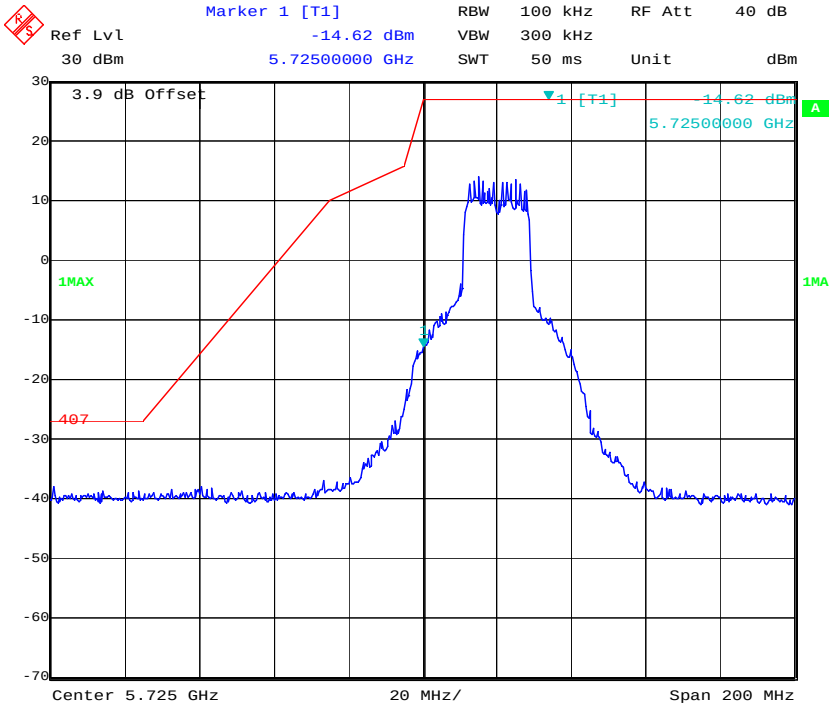
802.11a Low Channel



802.11a High Channel



802.11n ht20 Low Channel



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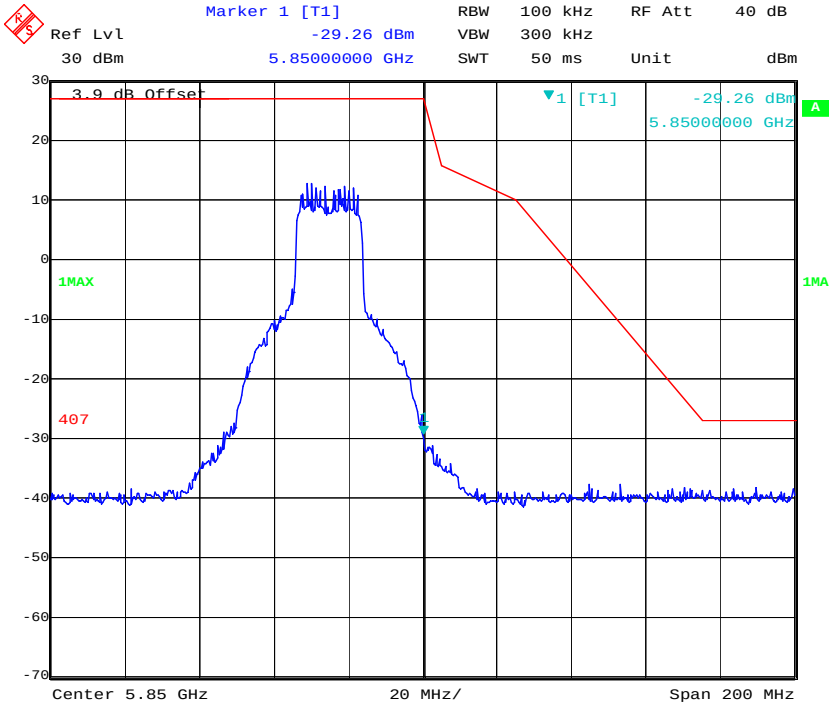
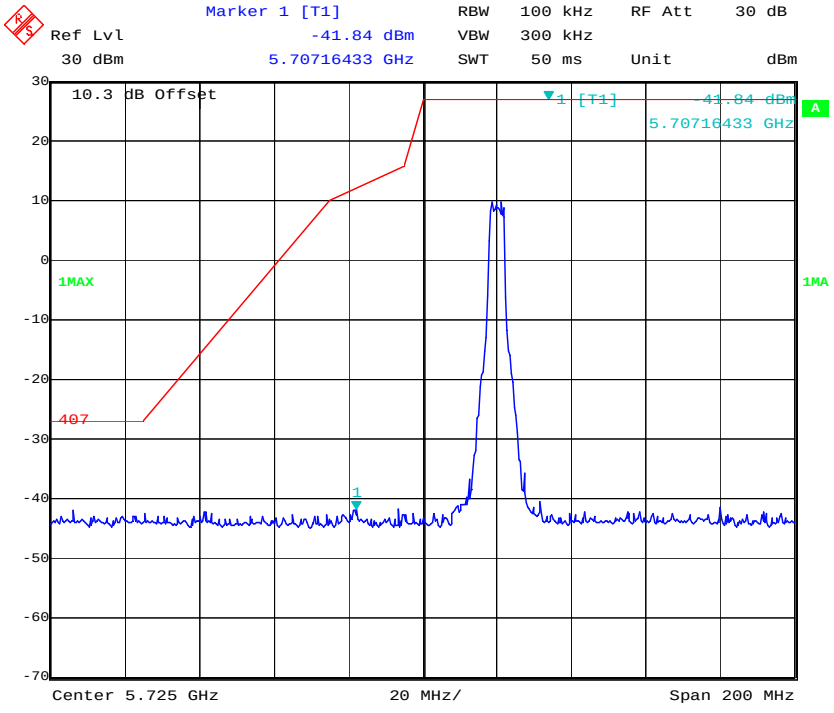
802.11n ht20 High Channel



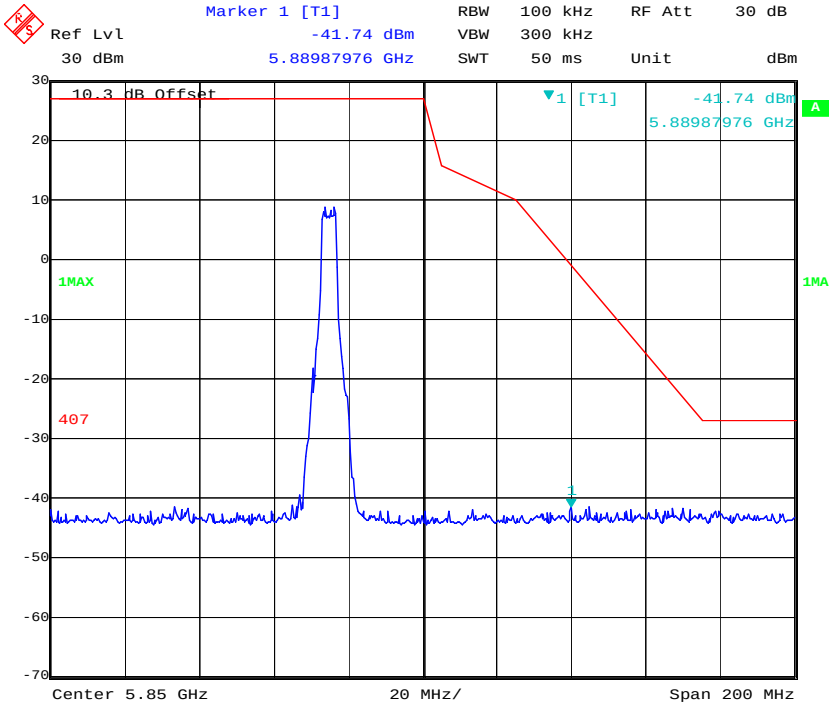
Date: 27.FEB.2017 21:55:18

5M Low Channel



Date: 11.MAR.2017 17:07:58

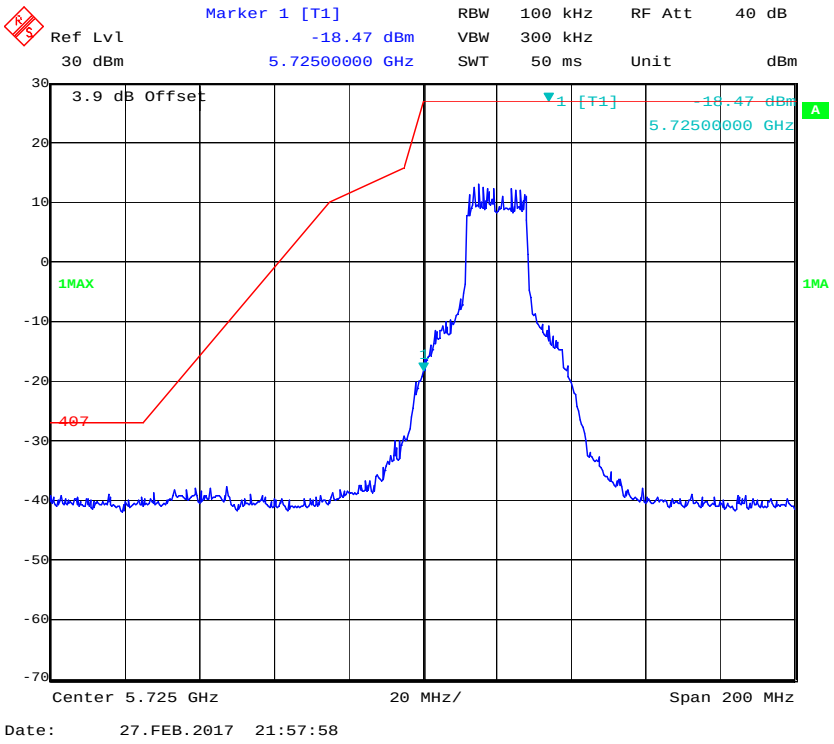
5M High Channel



Date: 11.MAR.2017 17:39:27

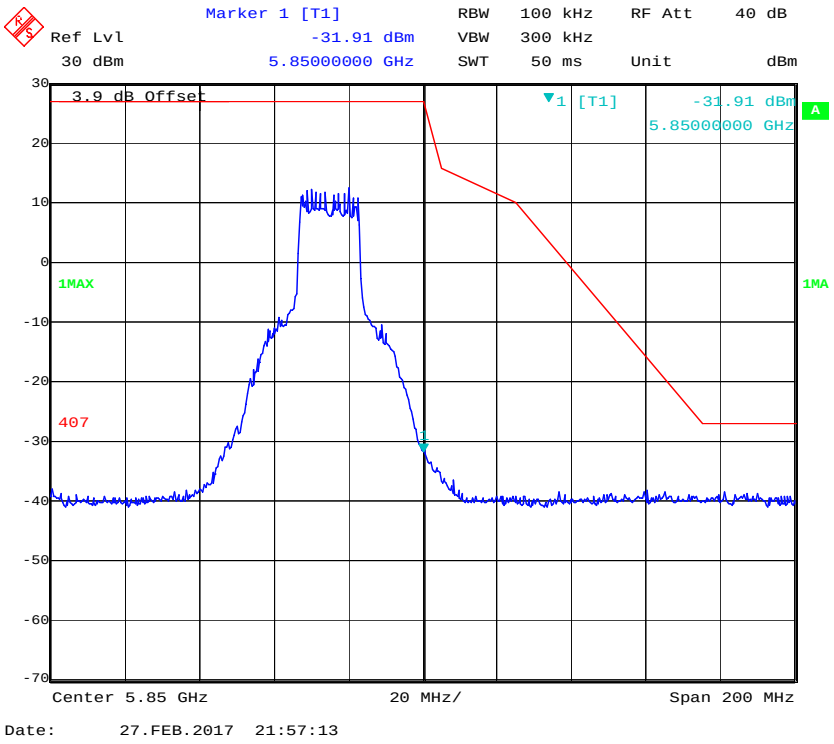
Chain 1:

802.11a Low Channel



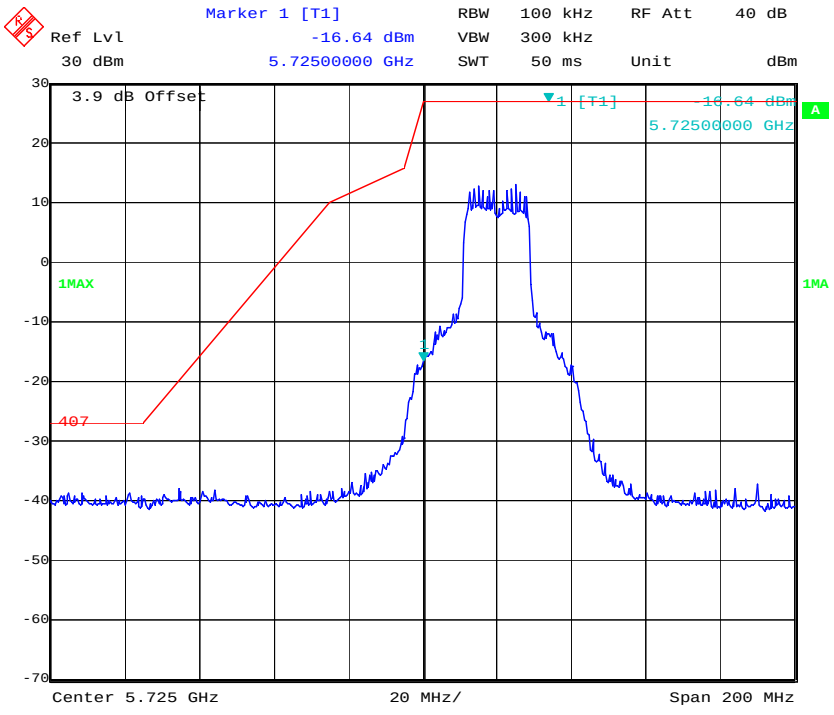
Date: 27.FEB.2017 21:57:58

802.11a High Channel



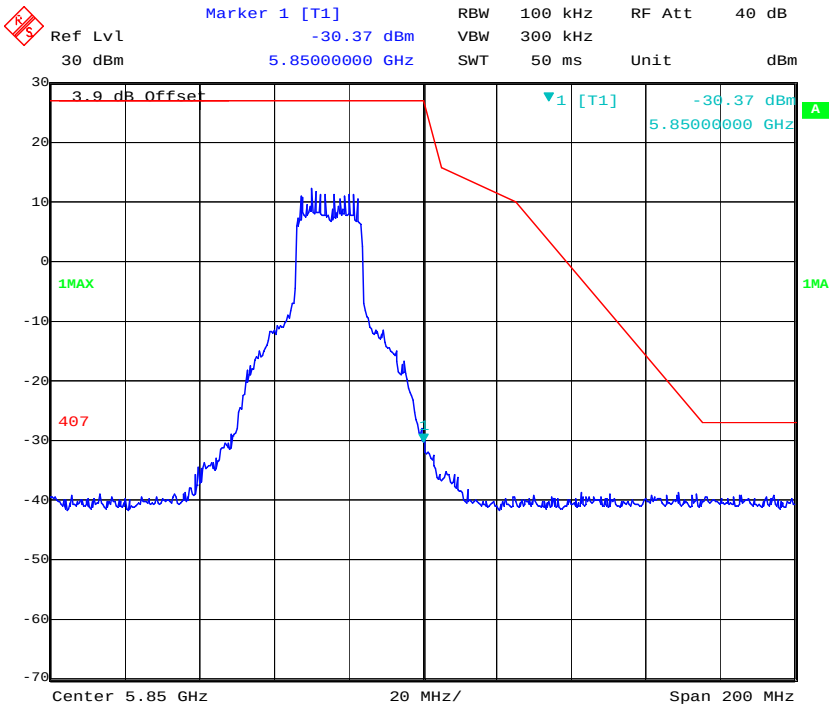
Date: 27.FEB.2017 21:57:13

802.11n ht20 Low Channel



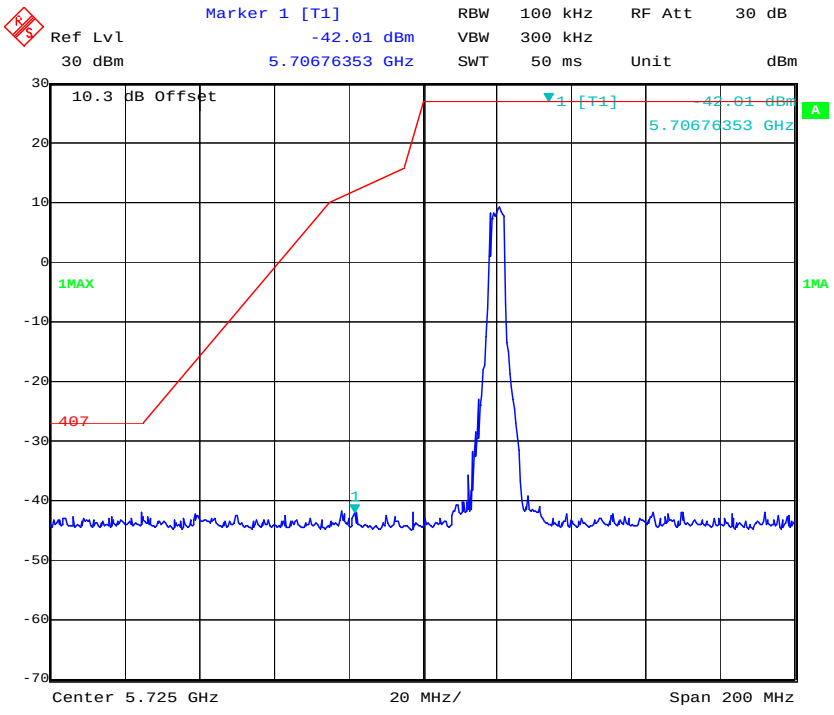
Date: 27.FEB.2017 21:58:27

802.11n ht20 High Channel



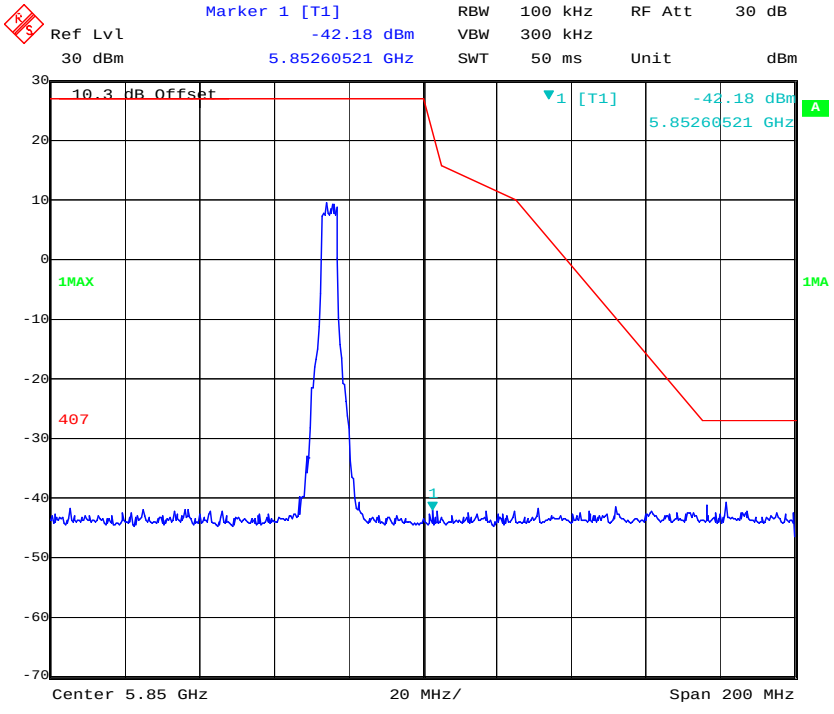
Date: 27.FEB.2017 21:56:28

5M Low Channel



Date: 11.MAR.2017 17:09:02

5M High Channel



Date: 11.MAR.2017 17:46:23

FCC §15.407(a) –EMISSION BANDWIDTH

Applicable Standard

15.407(a)

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	831929/005	2016-09-21	2017-09-20
N/A	RF Cable	N/A	N/A	Each Time	/
N/A	10dB Attenuator	10dB	10dB-1	Each Time	/

*** Statement of Traceability:** BACL (Chengdu) attested that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Procedure

According to KDB 789033 D02 General UNII Test Procedures New Rules v01r03

Test Data

Environmental Conditions

Temperature:	18~18.5 °C
Relative Humidity:	52~54 %
ATM Pressure:	96.2~96.5 kPa

The testing was performed by Kevin Hu on 2017-02-27&2017-03-11.

Test Result: Pass.

Please refer to the following tables and plots.

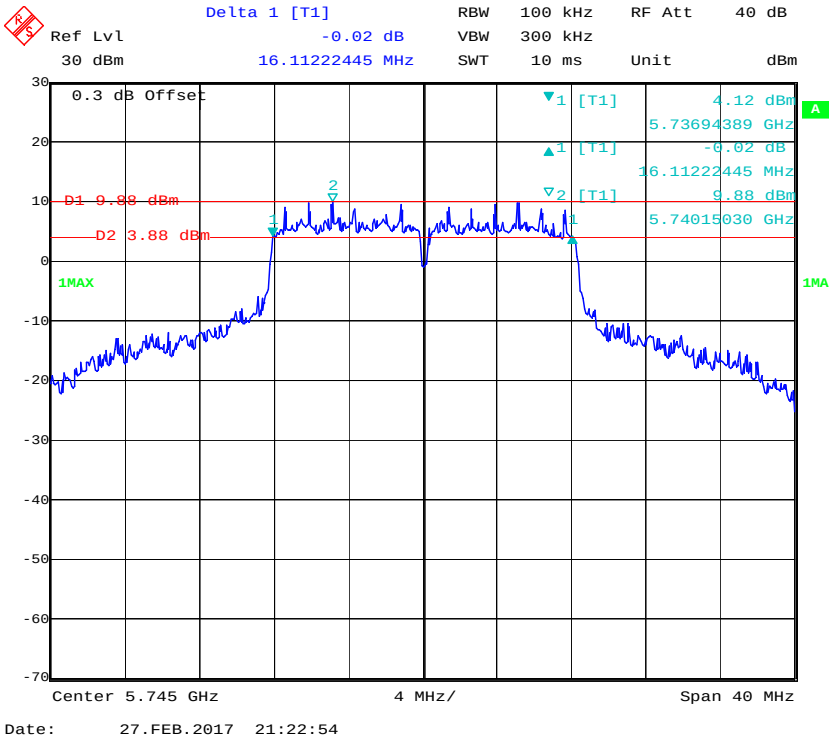
Test mode: Transmitting (Test was performed at chain 0)

UNII Band	Mode	Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	6 dB Emission Bandwidth Limits (MHz)
5725-5850MHz	802.11 a	Low	5745	16.11	20.84	≥0.5
		Middle	5785	15.95	25.81	≥0.5
		High	5825	15.63	23.49	≥0.5
	802.11 n ht20	Low	5745	16.43	21.24	≥0.5
		Middle	5785	16.35	22.61	≥0.5
		High	5825	16.67	20.6	≥0.5
	5M	Low	5745	4.168	4.529	≥0.5
		Middle	5785	4.188	4.429	≥0.5
		High	5825	4.148	4.629	≥0.5

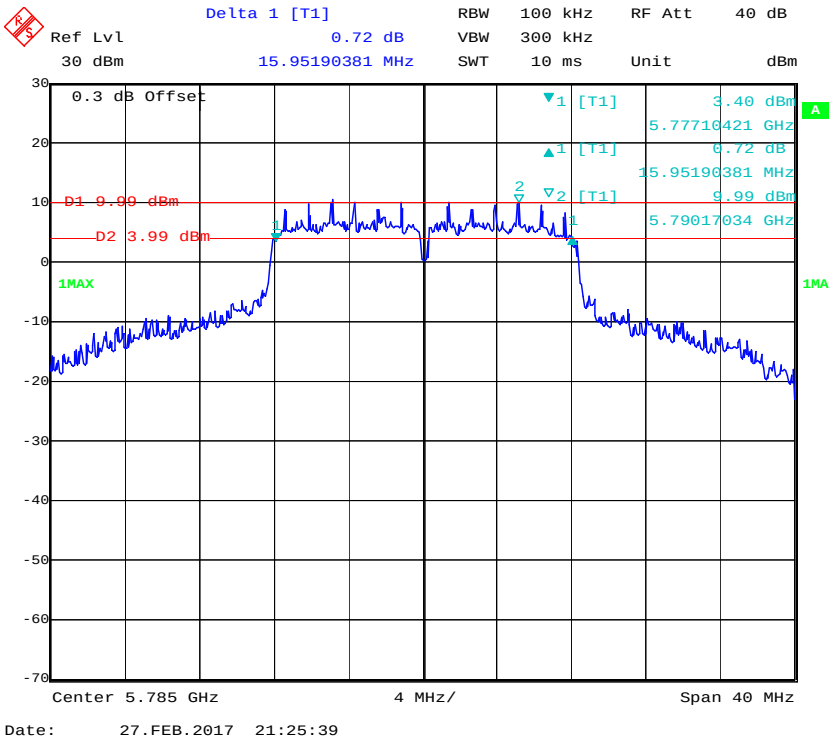
Note: the 99% Occupied Bandwidth have not fall into 5470-5725MHz, please refer to the test plots of 99% Occupied Bandwidth.

5725-5850MHz
6dB Bandwidth:

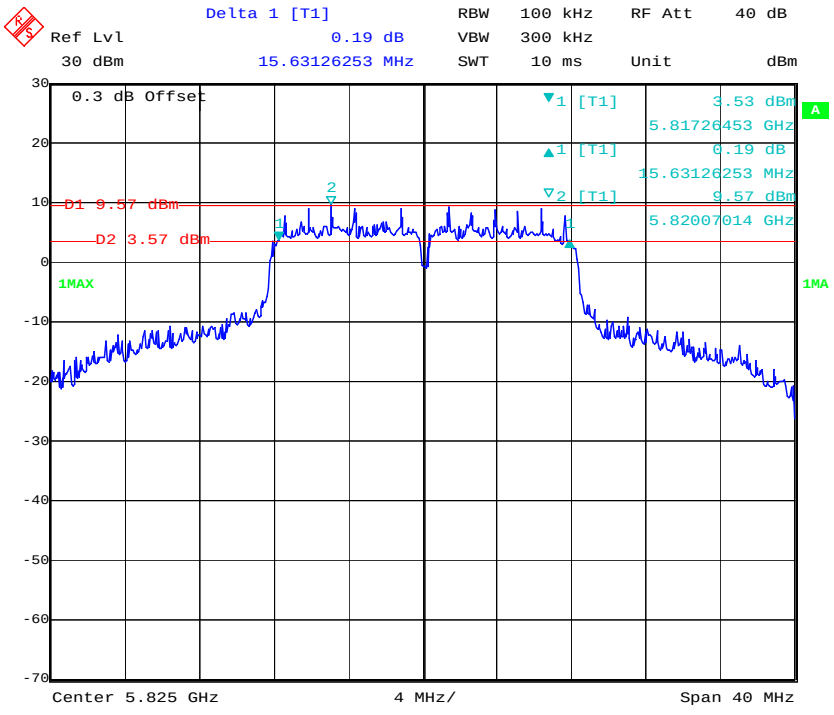
802.11a Low Channel



802.11a Middle Channel

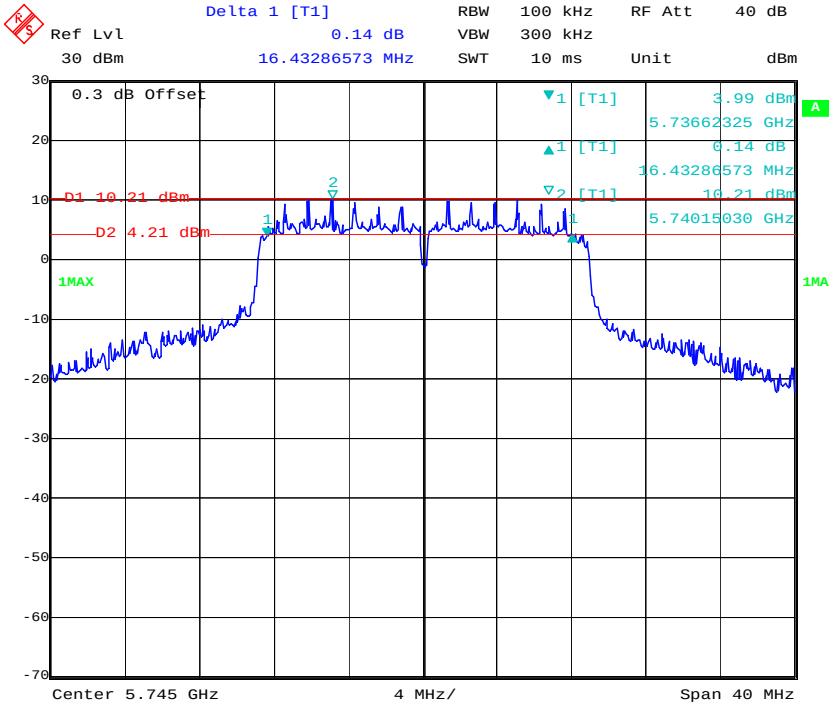


802.11a High Channel



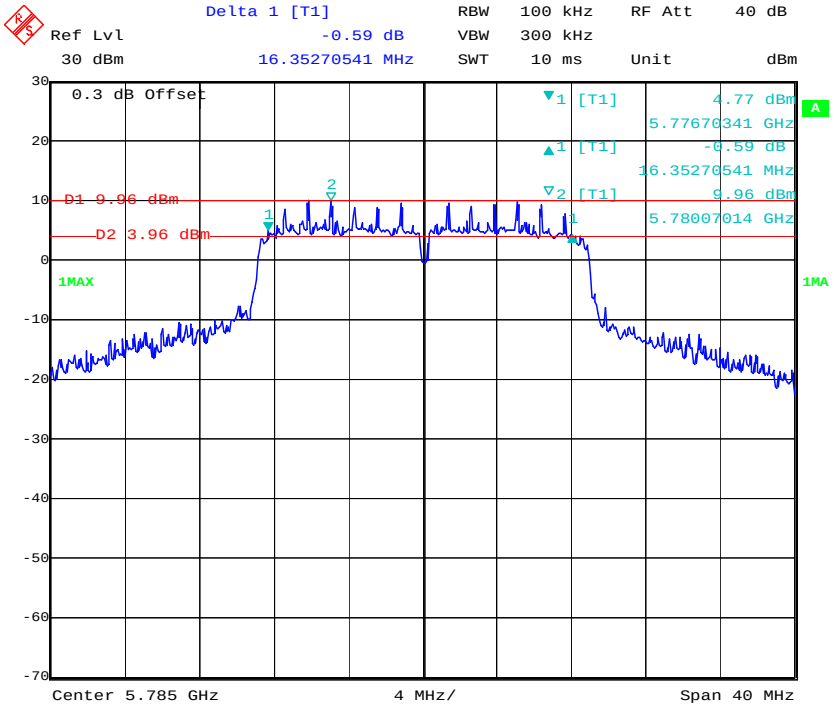
Date: 27.FEB.2017 21:27:27

802.11n ht20 Low Channel



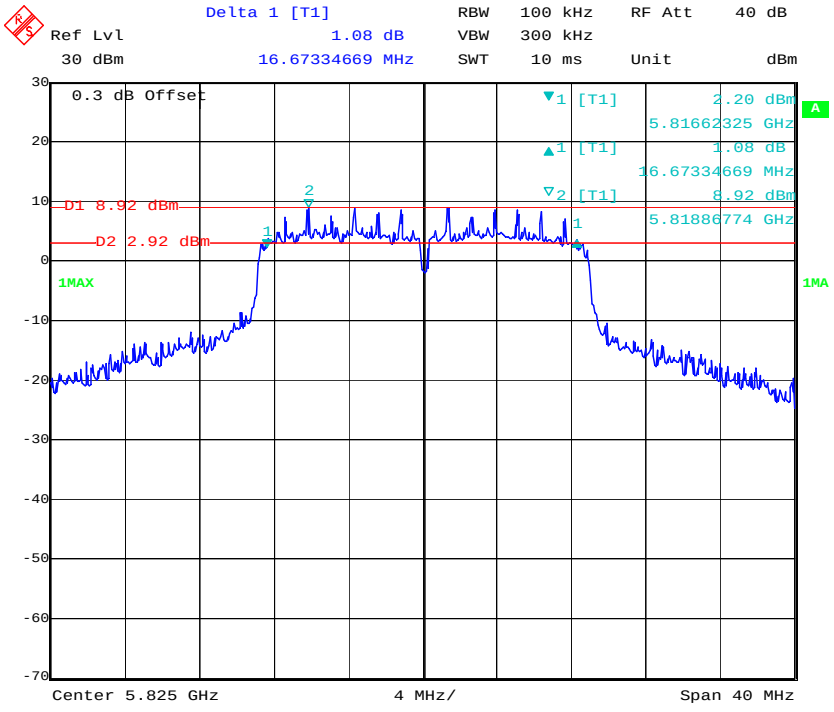
Date: 27.FEB.2017 21:49:41

802.11n ht20 Middle Channel



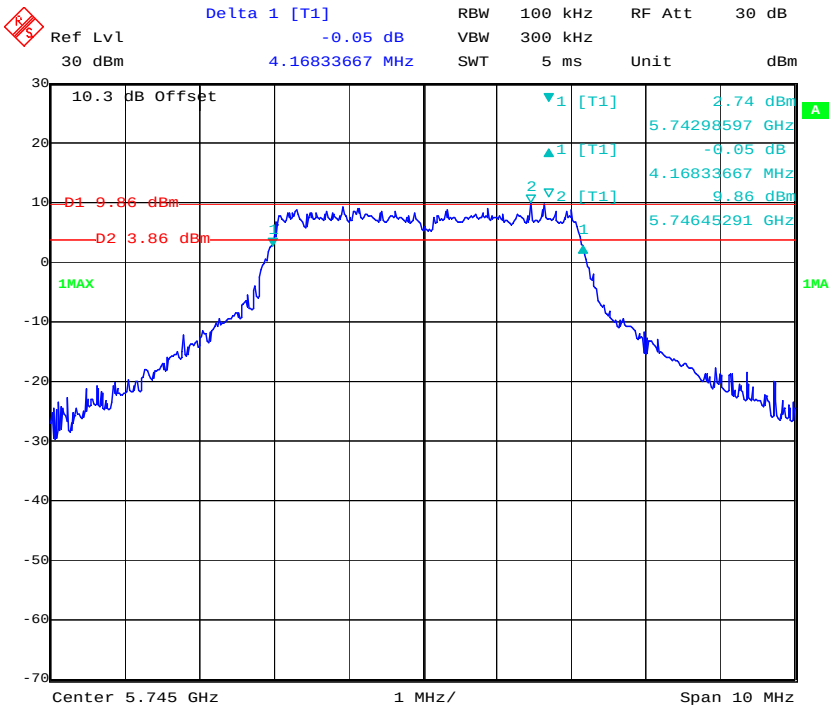
Date: 27.FEB.2017 21:30:51

802.11n ht20 High Channel



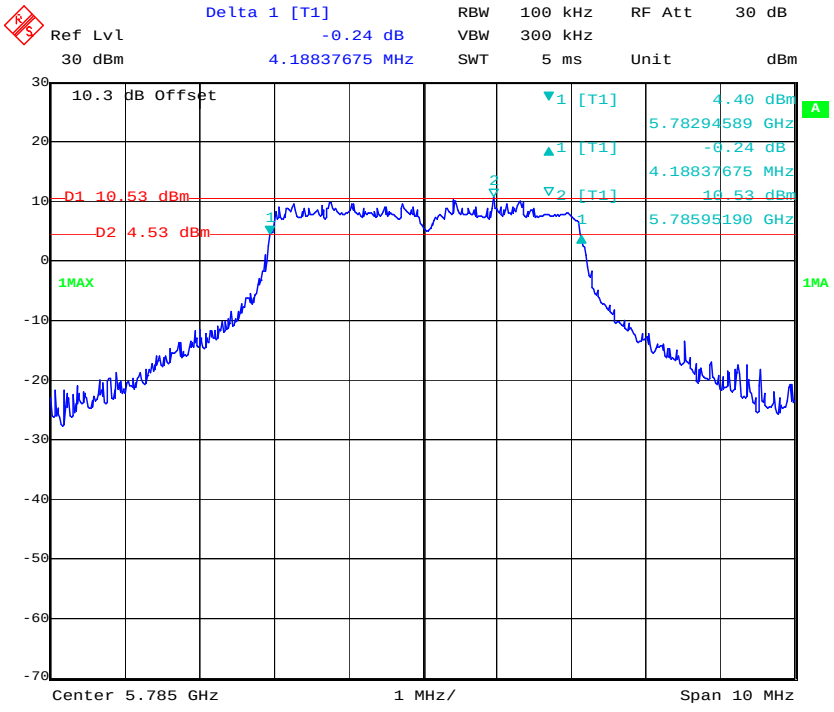
Date: 27.FEB.2017 21:29:17

5M Low Channel



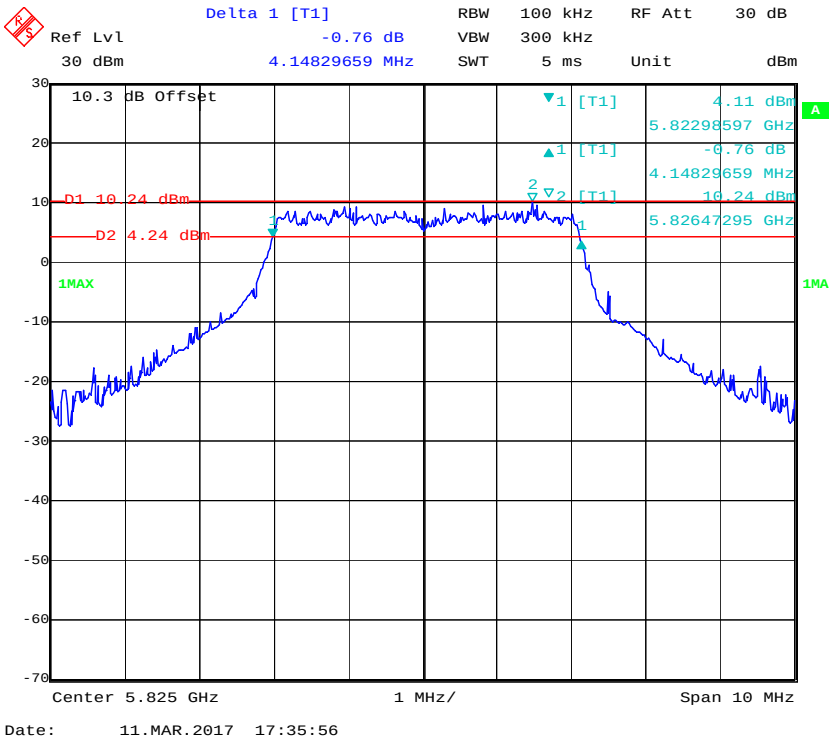
Date: 11.MAR.2017 16:39:19

5M Middle Channel



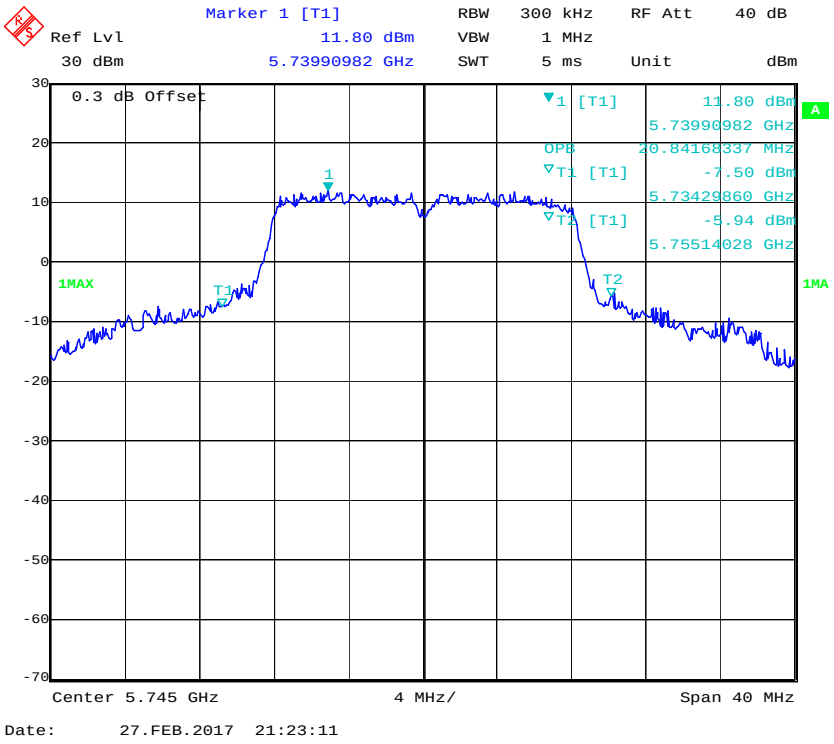
Date: 11.MAR.2017 17:21:14

5M High Channel

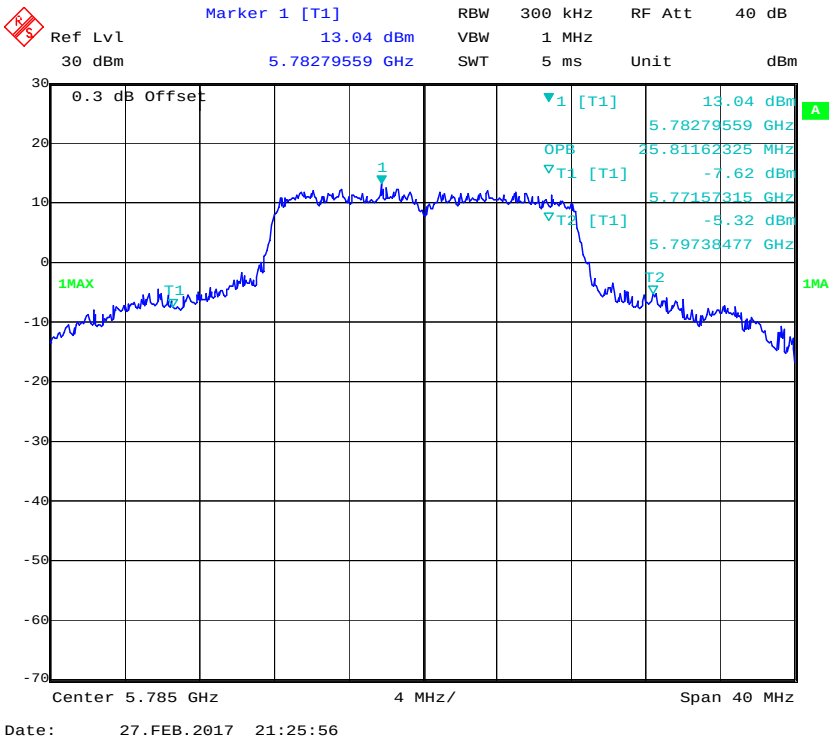


99% Occupied Bandwidth:

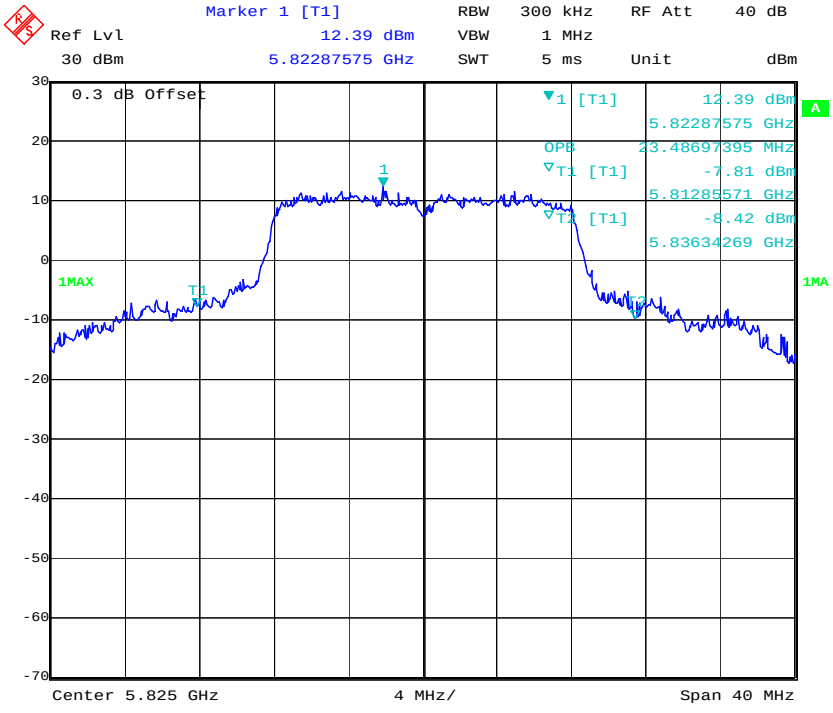
802.11a Low Channel



802.11a Middle Channel

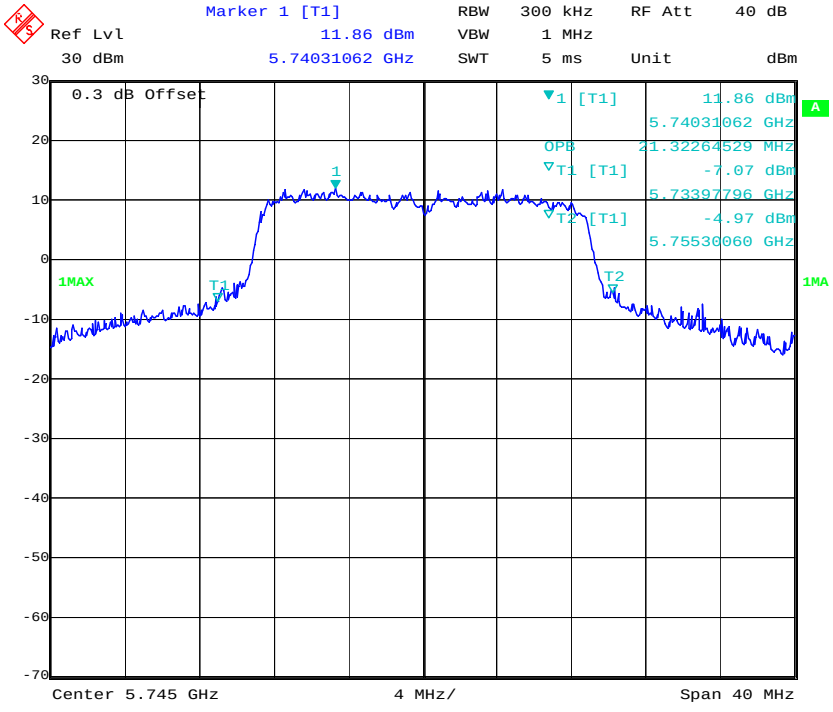


802.11a High Channel



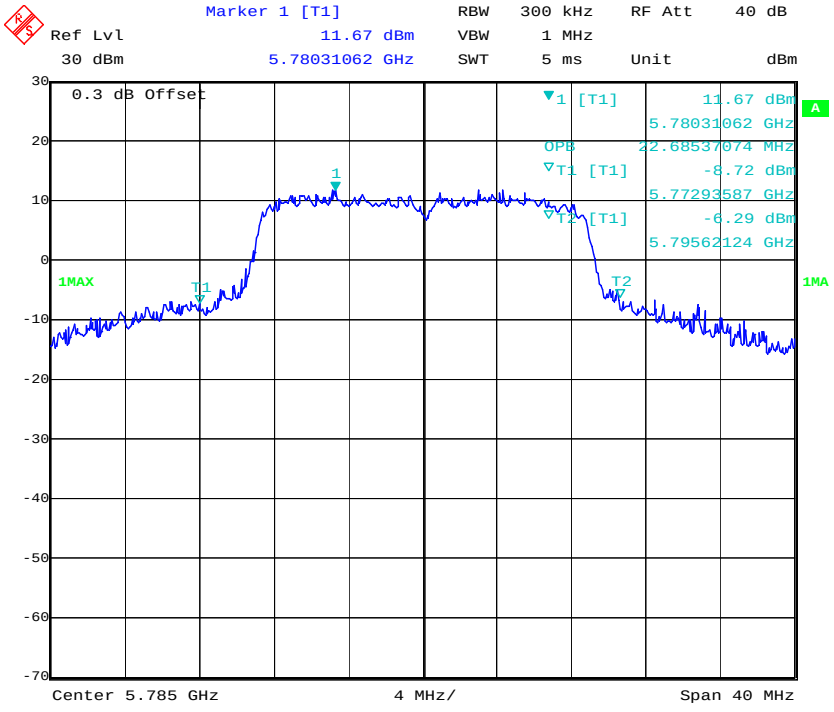
Date: 27.FEB.2017 21:27:45

802.11n ht20 Low Channel

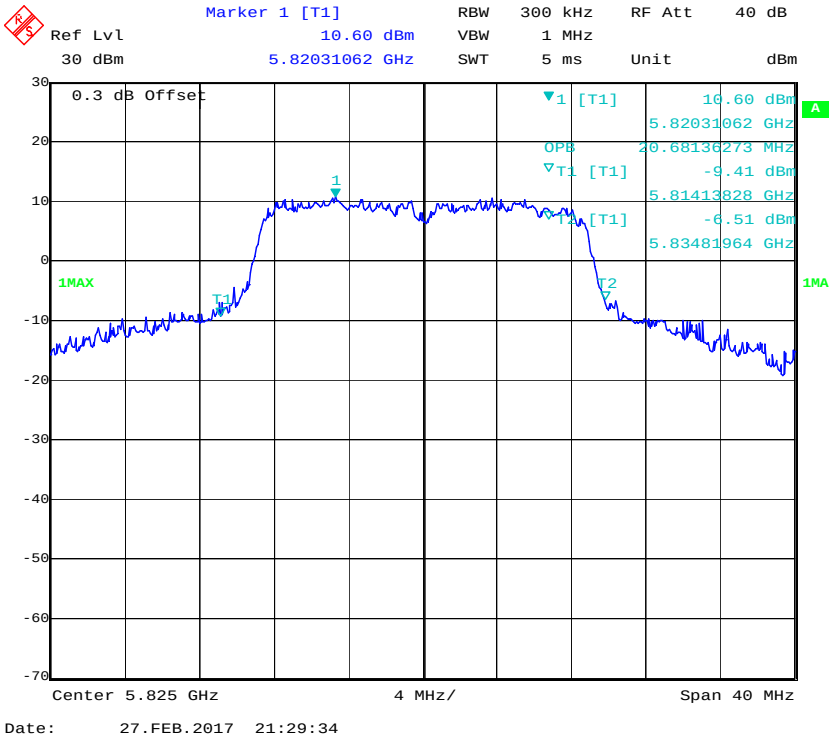


Date: 27.FEB.2017 21:49:58

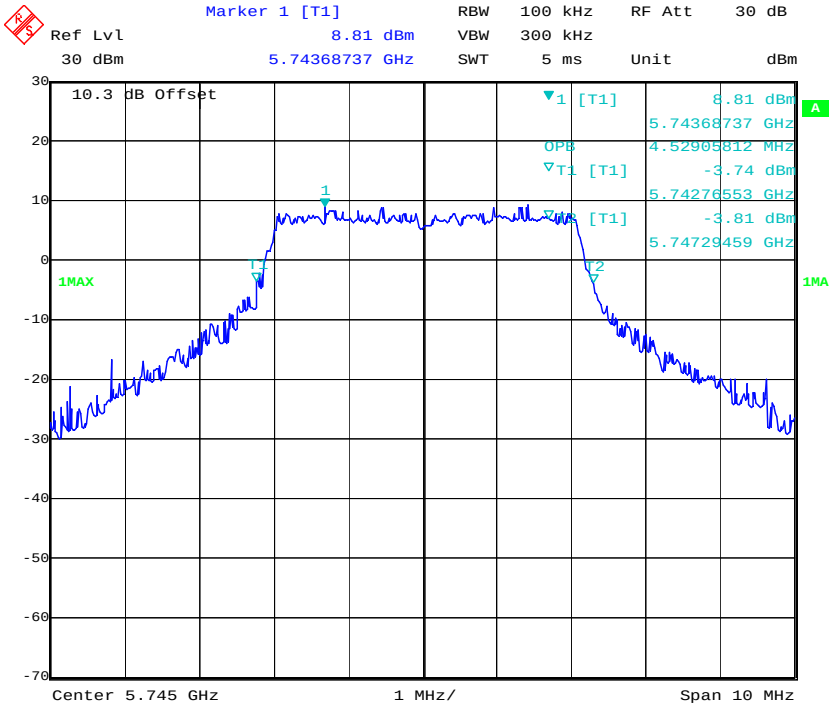
802.11n ht20 Middle Channel



802.11n ht20 High Channel

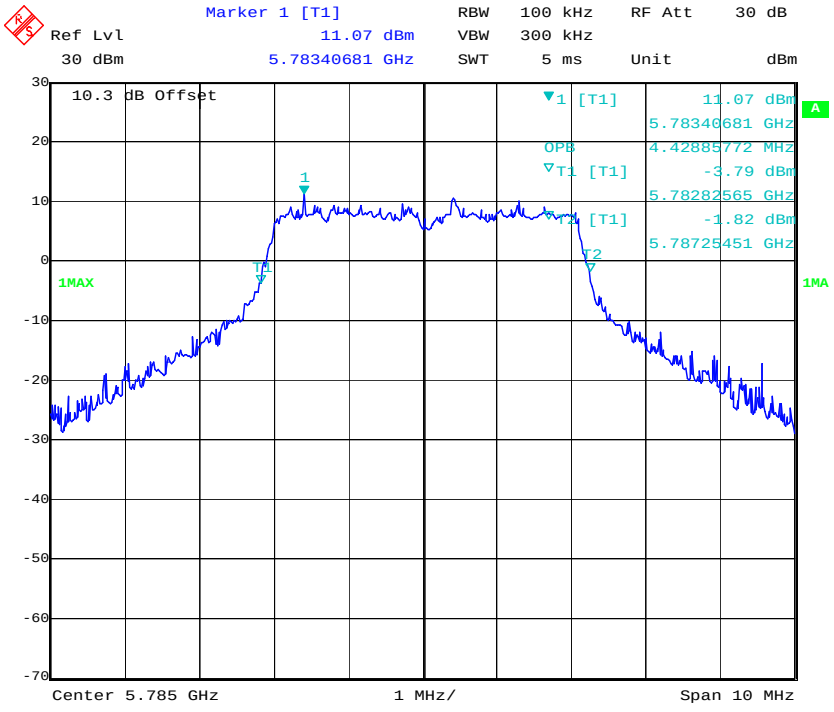


5M Low Channel



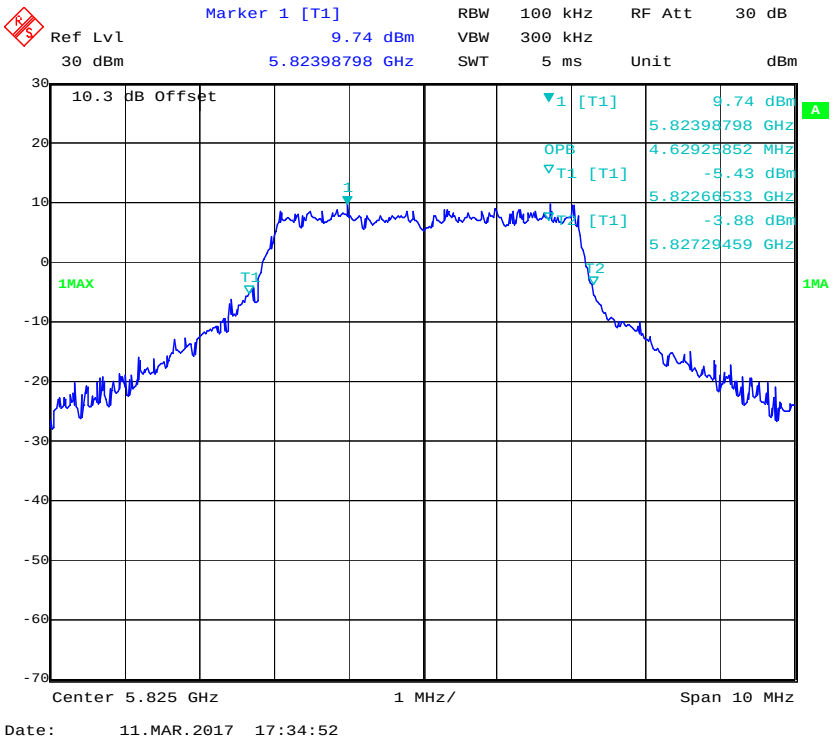
Date: 11.MAR.2017 16:40:39

5M Middle Channel



Date: 11.MAR.2017 17:19:51

5M High Channel



FCC §15.407(g) – FREQUENCY STABILITY

Applicable Standard

FCC §15.407

(g) Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the users manual.

Test Procedure

According to C63.10-2013 clause 6.8.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	831929/005	2016-09-21	2017-09-20
N/A	RF Cable	N/A	N/A	Each Time	/
FLUKE	Multimeter	1587	27870099	2016-12-30	2017-12-29
BACL	High Temperature Test Chamber	BTH-150	30024	2016-12-02	2017-12-01

*** Statement of Traceability:** BACL (Chengdu) attested that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	26.3 °C
Relative Humidity:	39 %
ATM Pressure:	95.5 kPa

The testing was performed by Kevin Hu on 2017-03-11.

Test Result: Pass.

Un-modulation, channel 5745 MHz			
Temperature	**Voltage**	**Measured Frequency**	**Result**
℃	**V_{DC}**	**MHz**	
-20	11.4	5745.008	Pass
-10		5745.006	
10		5745.004	
20		5745.010	
30		5745.002	
40		5745.002	
25	13.05	5745.010	
25	9.7	5745.002	

Note: Based on the frequency stability and emission bandwidth, the emission is maintained within the band of operation.

FCC §15.407(a) –MAXIMUM CONDUCTED OUTPUT POWER

Applicable Standard

(a) Power limits:

(1) For the band 5.15-5.25 GHz.

(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output

power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(3) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(4) The maximum conducted output power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Agilent	Wideband Power Sensor	N1921A	MY54170074	2017-01-03	2018-01-03
Agilent	P-Series Power Meter	N1912A	MY5000798	2017-01-03	2018-01-03
N/A	RF Cable	N/A	N/A	Each Time	/

*** Statement of Traceability:** BACL (Chengdu) attested that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Procedure

According to KDB 789033 D02 General UNII Test Procedures New Rules v01r03

Test Data

Environmental Conditions

Temperature:	19 °C
Relative Humidity:	54 %
ATM Pressure:	96 kPa

The testing was performed by Kevin Hu on 2017-03-14.

Test Mode: Transmitting

UNII Band	Mode	Frequency (MHz)	RMS Channel Power (dBm)		Total (dBm)	Limits (dBm)	Result
			Chain 0	Chain 1			
5725-5850MHz	802.11a	5745	20.31	19.34	22.86	30	PASS
		5785	19.97	19.58	22.79	30	PASS
		5825	18.97	18.68	21.84	30	PASS
	802.11n ht20	5745	20.19	19.31	22.78	30	PASS
		5785	19.91	19.34	22.64	30	PASS
		5825	18.86	18.43	21.66	30	PASS
	5M	5745	18.25	18.38	21.33	30	PASS
		5785	17.84	17.67	20.77	30	PASS
		5825	17.23	17.53	20.39	30	PASS

Note 1: Duty cycle corrected factor has been added in the test result for 5M mode.

Note 2: the 2 antenna maximum atenna gains are 3.57 dBi, and employed Cyclic Delay Diversity (CDD) for 802.11 MIMO transmitting, per KDB 662911 D01 Multiple Transmitter Output v02r01, for power measurements on IEEE 802.11 devices:

Array Gain = 0 dB (i.e., no array gain) for NANT ≤ 4;

So:

Directional gain = GANT + Array Gain = 3.57 dBi < 6dBi

FCC §15.407(a) - POWER SPECTRAL DENSITY

Applicable Standard

(a) Power limits:

(1) For the band 5.15-5.25 GHz.

(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output

power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(3) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

Test Procedure

According to KDB 789033 D02 General UNII Test Procedures New Rules v01r03

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	831929/005	2016-09-21	2017-09-20
N/A	RF Cable	N/A	N/A	Each Time	/
N/A	10dB Attenuator	10dB	10dB-1	Each Time	/

*** Statement of Traceability:** BACL (Chengdu) attested that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	18~18.5 °C
Relative Humidity:	52~54 %
ATM Pressure:	96.2~96.5 kPa

The testing was performed by Kevin Hu on 2017-02-27&2017-03-11.

Test Mode: Transmitting

Test Result:Compliance.Please refer to the following table and plot.

5725-5850MHz:

Mode	Channel	Frequency MHz	PSD (dBm/300kHz)		Total (dBm/500kHz)	Result Corrected Duty Cycle Factor (dBm/500kHz)	Limit (dBm/500kHz)
			Chain 0	Chain 1			
802.11a	Low	5745	9	7.73	13.64	13.64	29.43
	Middle	5785	8.76	7.71	13.5	13.5	29.43
	High	5825	7.67	7.73	12.93	12.93	29.43
802.11n ht20	Low	5745	8.74	7.29	13.3	13.3	29.43
	Middle	5785	9.2	7.35	13.6	13.6	29.43
	High	5825	7.35	8.1	12.97	12.97	29.43
5M	Low	5745	8.88	9.96	12.46	14.13	29.43
	Middle	5785	10.36	11.19	13.81	15.48	29.43
	High	5825	10.15	10.24	13.21	14.88	29.43

Note: For 802.11a/n and 5M mode, the device employed Cyclic Delay Diversity (CDD) for MIMO transmitting, per C63.10-2013 clause 14.4.3.2.5 a,

For power density measurements,

Array Gain = 10 log(N_{ANT}/N_{SS}) dB.

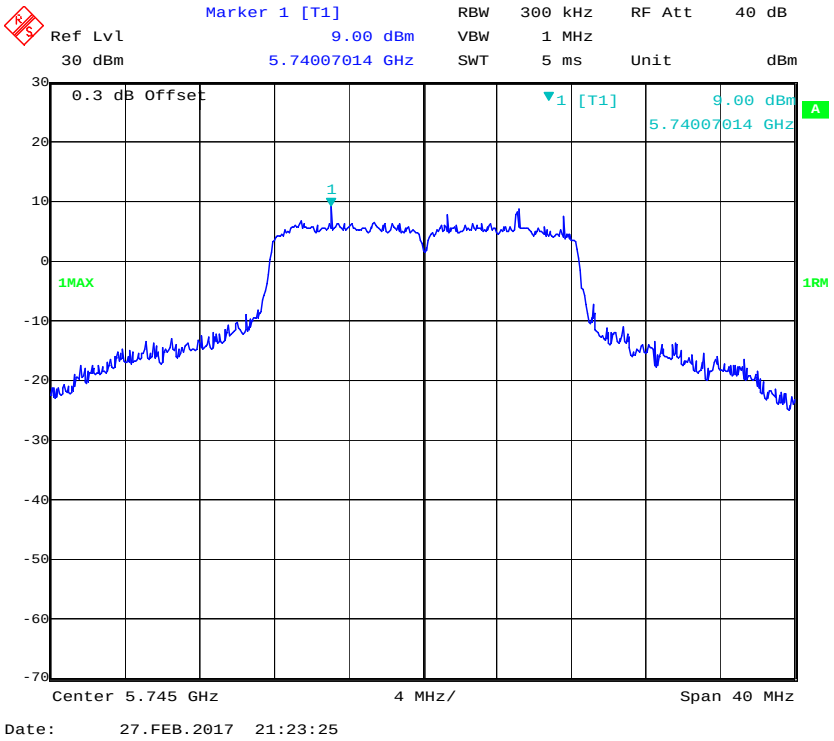
So:

Directional gain = GANT + Array Gain = 3.57+10*log(2) =6.57 dBi

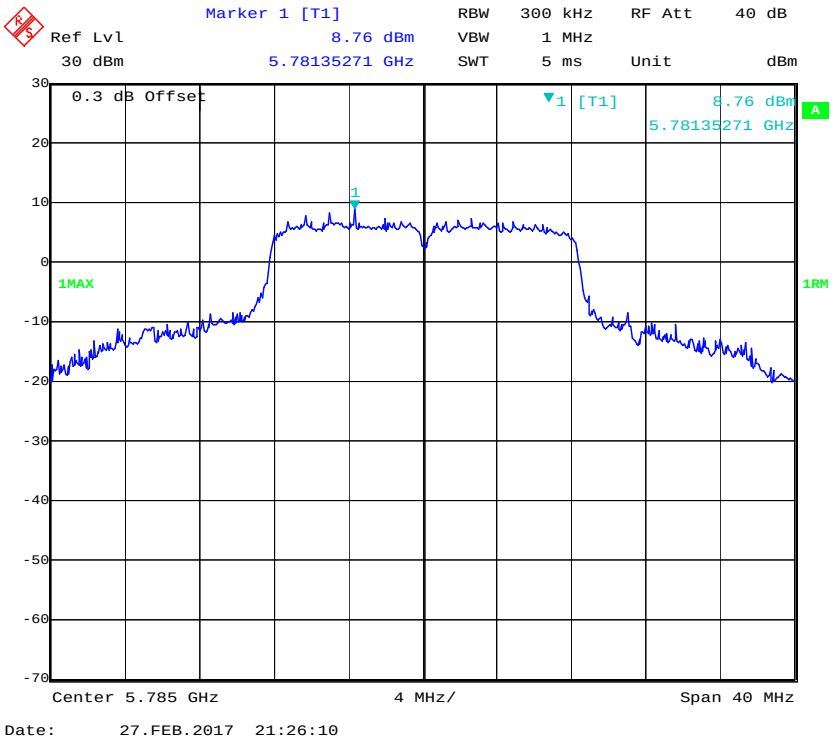
The measurement bandwidth of Maximum PSD is specified in 500 kHz, add 10log(500kHz/RBW) to the measured result, whereas RBW (< 500 kHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.

5725MHz-5850MHz:
Chain 0:

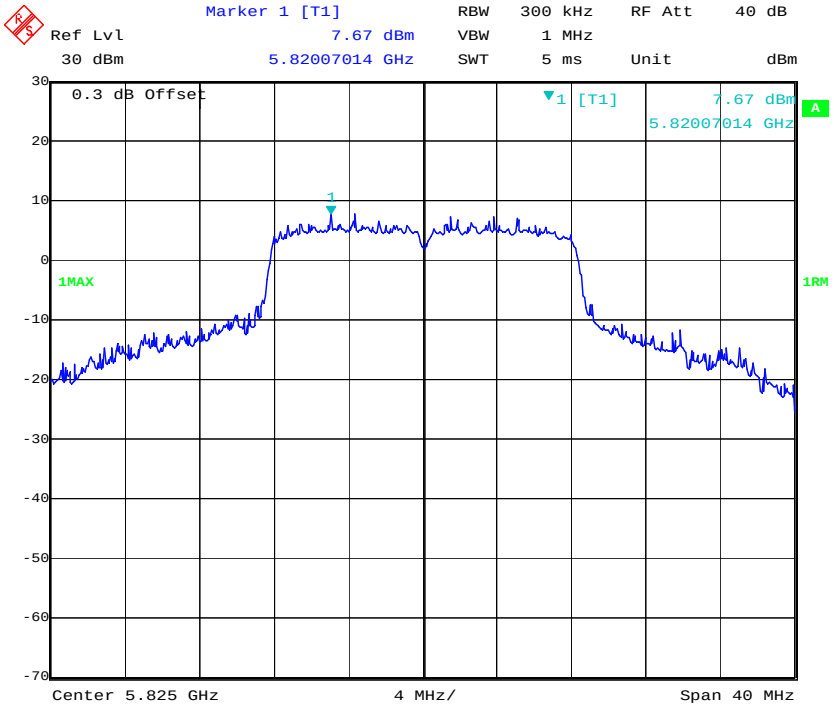
802.11a Low Channel



802.11a Middle Channel

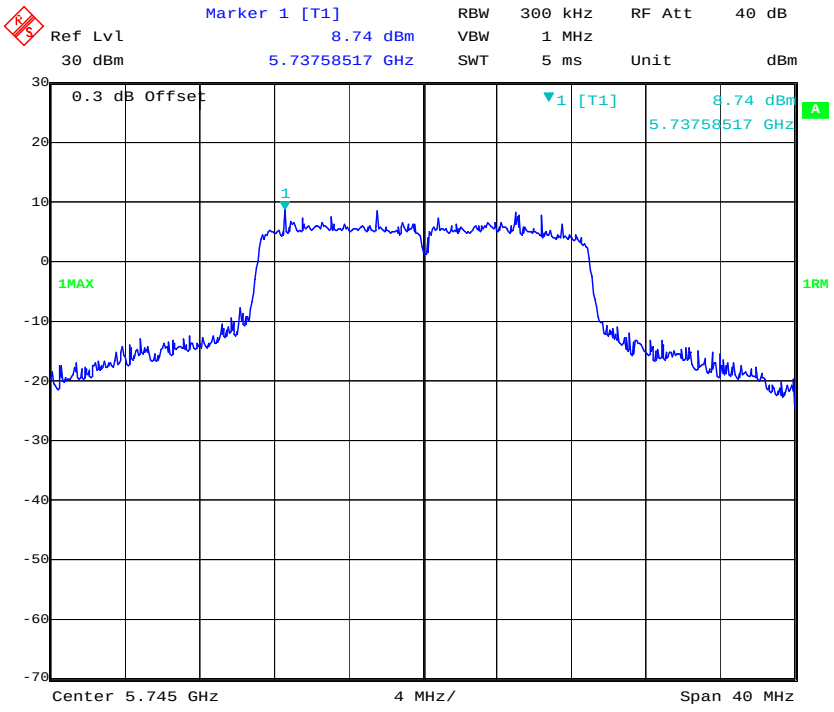


802.11a High Channel



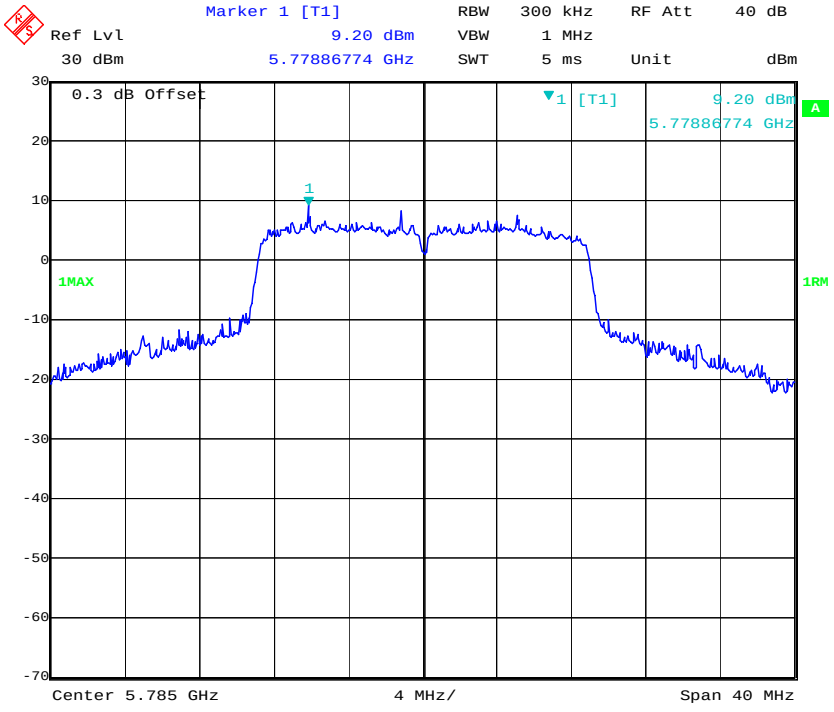
Date: 27.FEB.2017 21:27:58

802.11n ht20 Low Channel



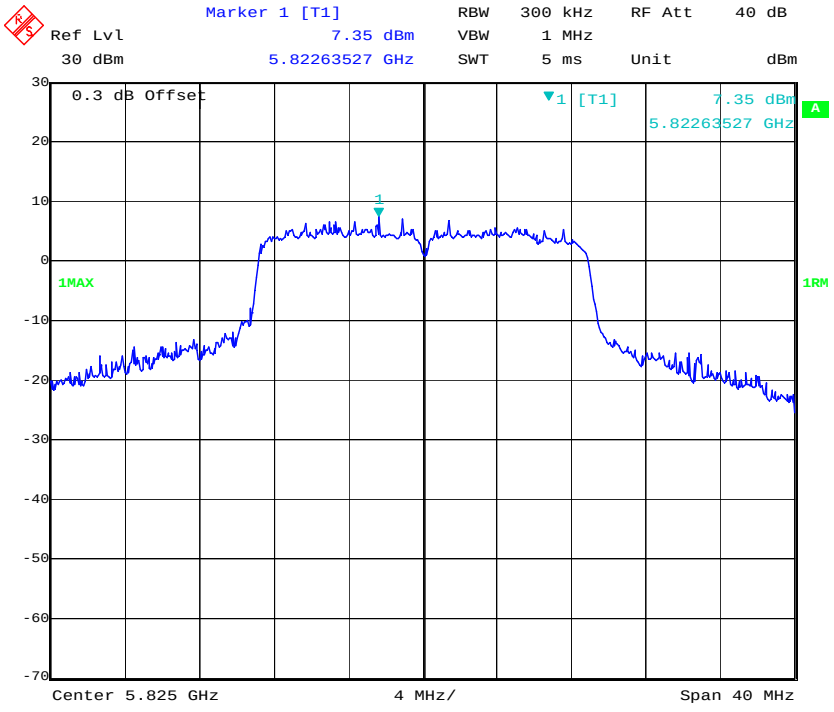
Date: 27.FEB.2017 21:50:12

802.11n ht20 Middle Channel



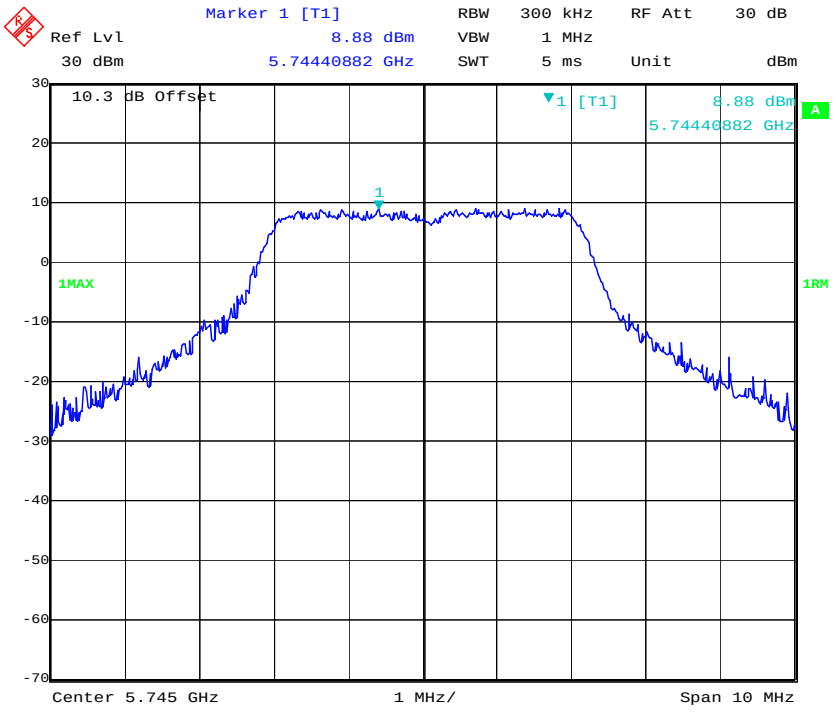
Date: 27.FEB.2017 21:31:22

802.11n ht20 High Channel



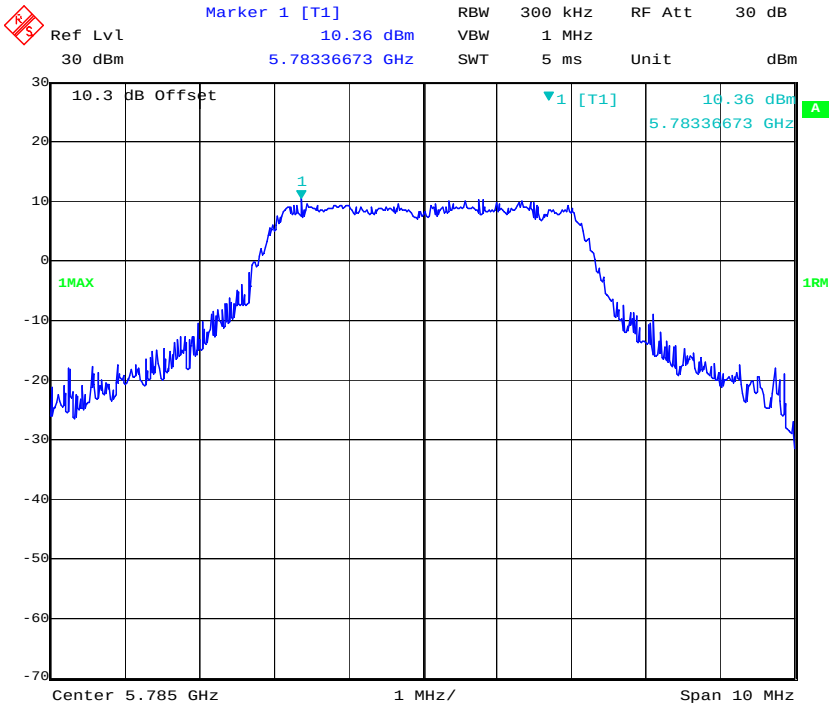
Date: 27.FEB.2017 21:29:49

5M Low Channel



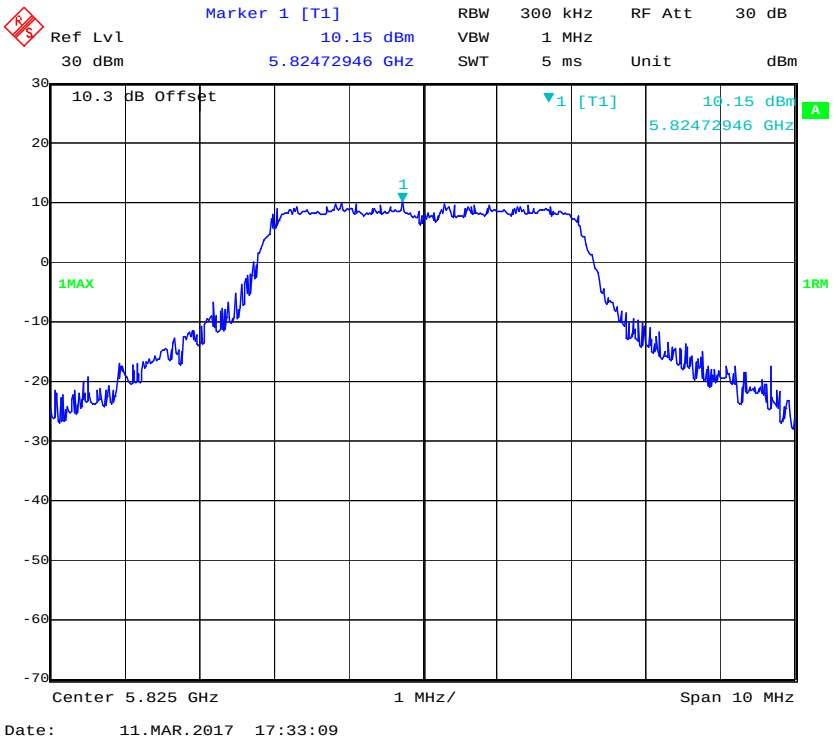
Date: 11.MAR.2017 17:02:00

5M Middle Channel



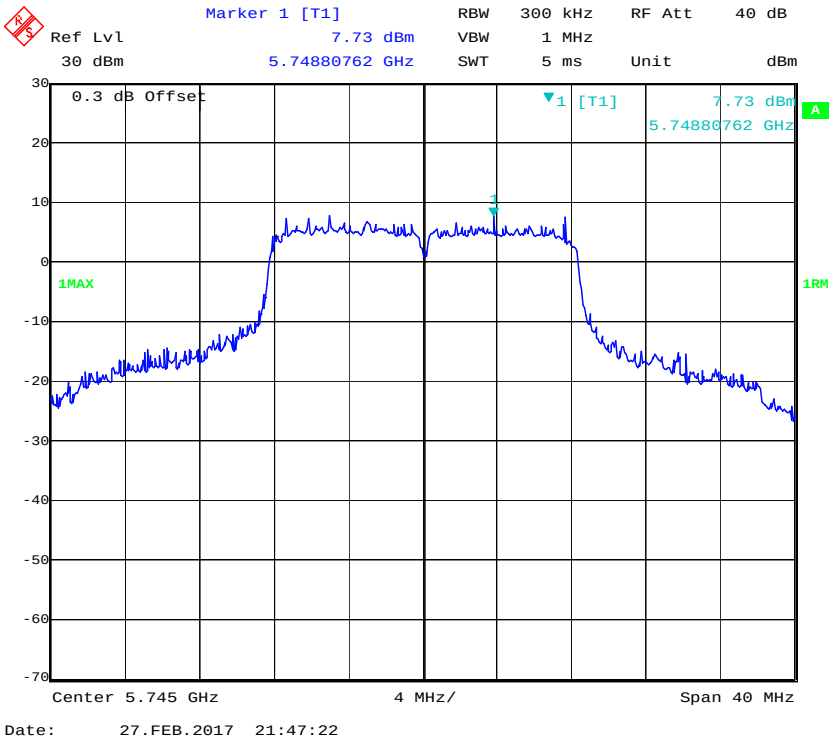
Date: 11.MAR.2017 17:29:39

5M High Channel

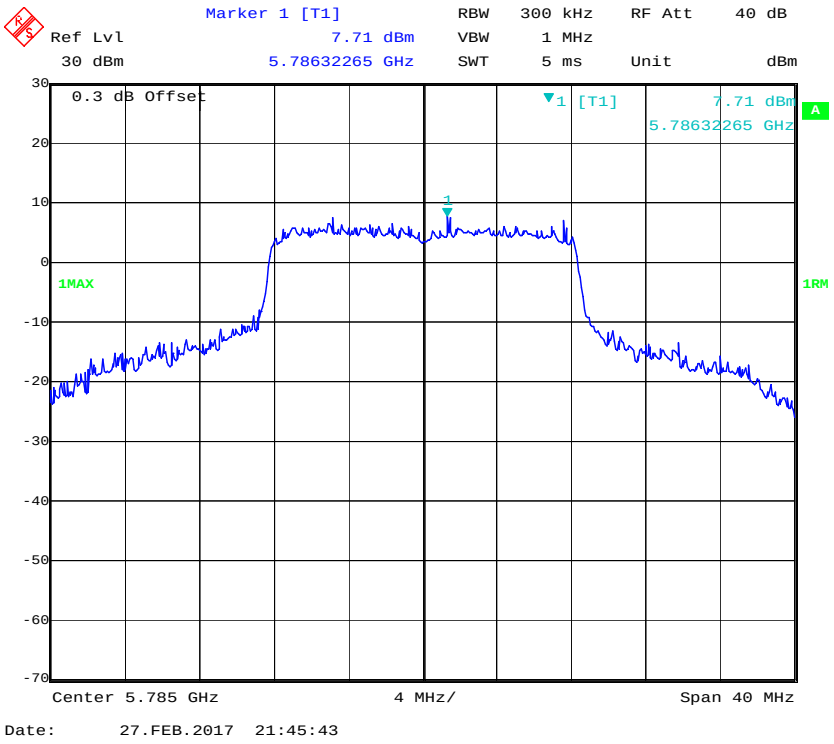


Chain 1:

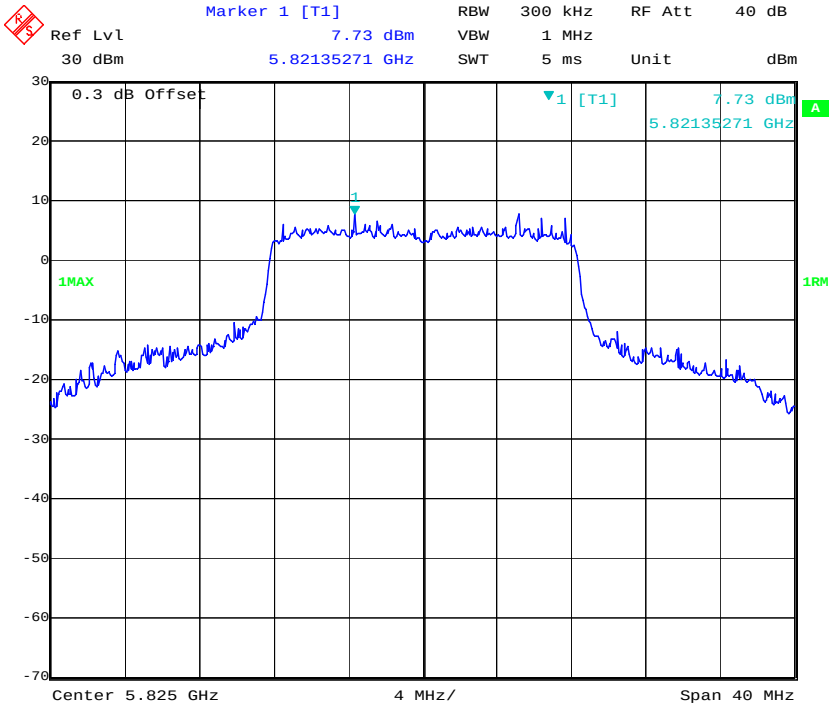
802.11a Low Channel



802.11a Middle Channel

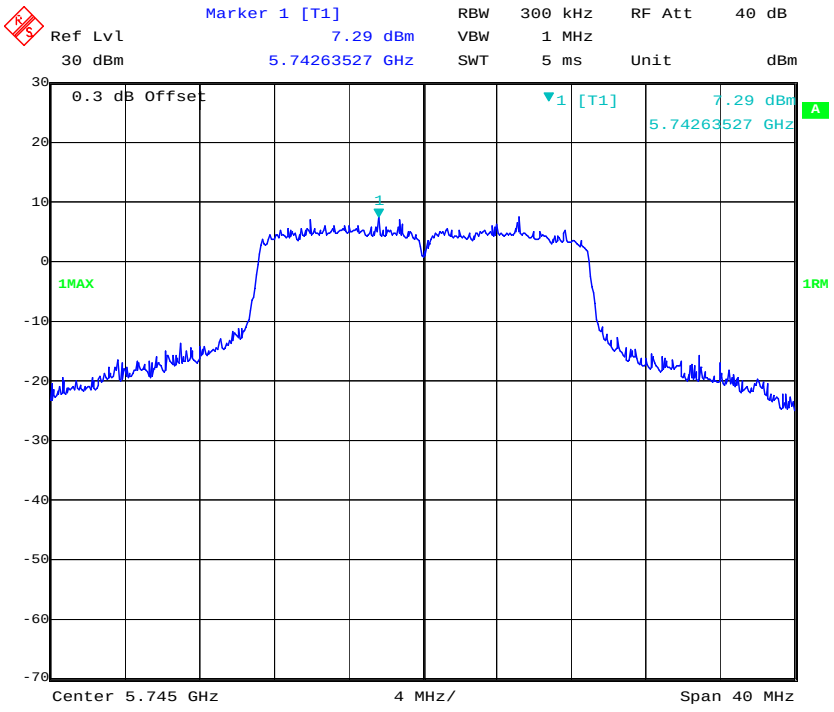


802.11a High Channel



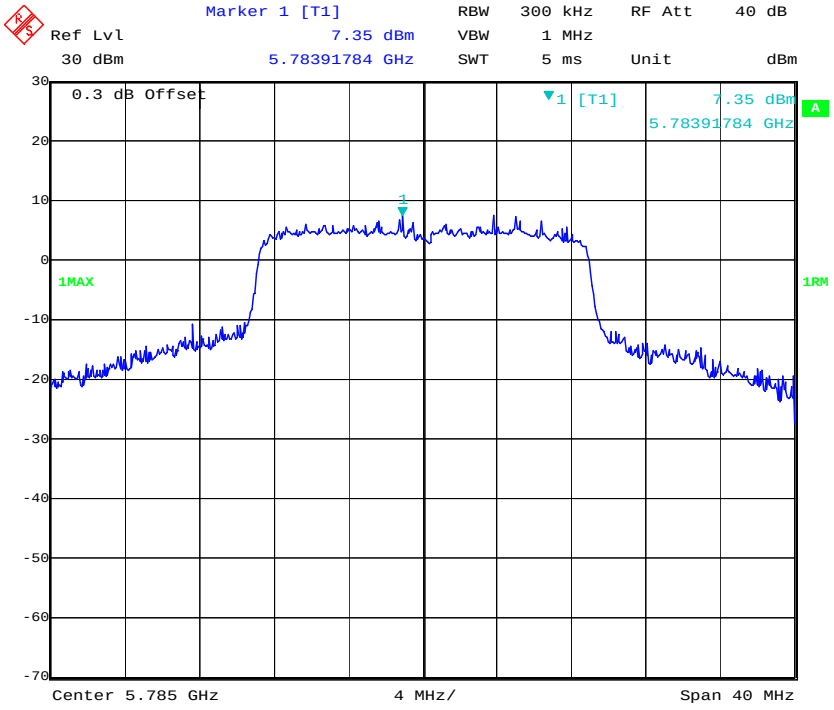
Date: 27.FEB.2017 21:43:55

802.11n ht20 Low Channel



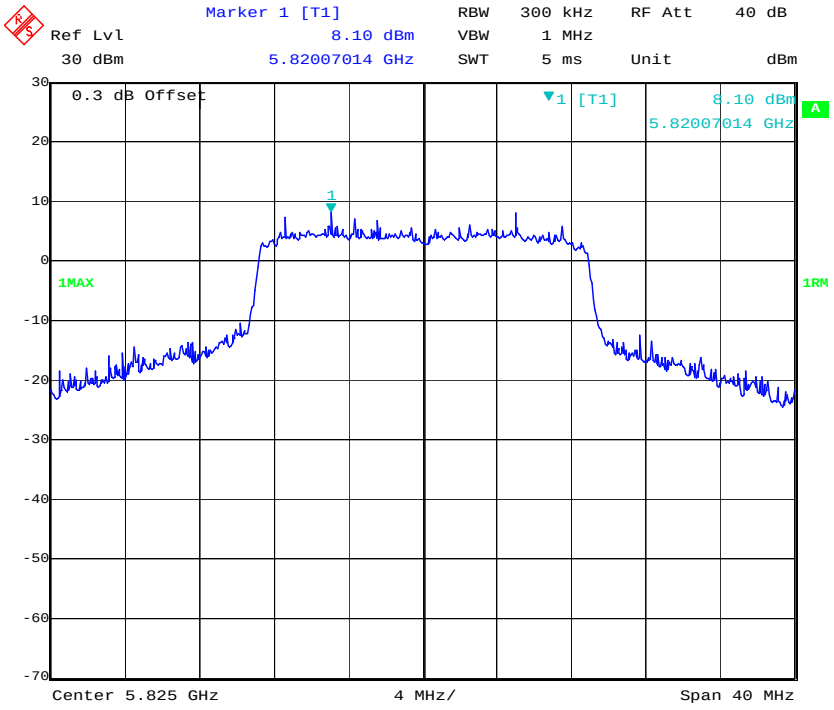
Date: 27.FEB.2017 21:37:41

802.11n ht20 Middle Channel



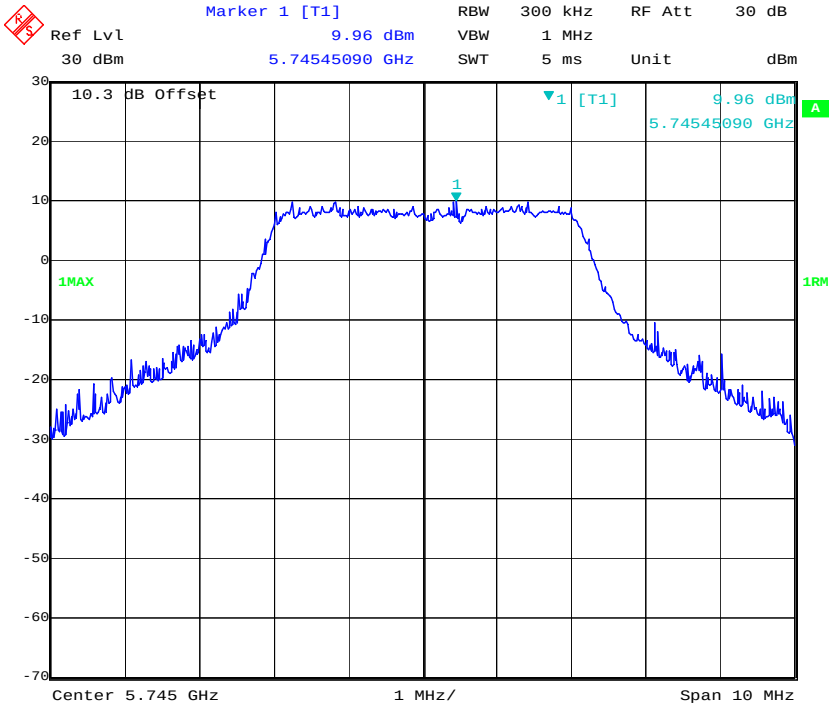
Date: 27.FEB.2017 21:40:33

802.11n ht20 High Channel



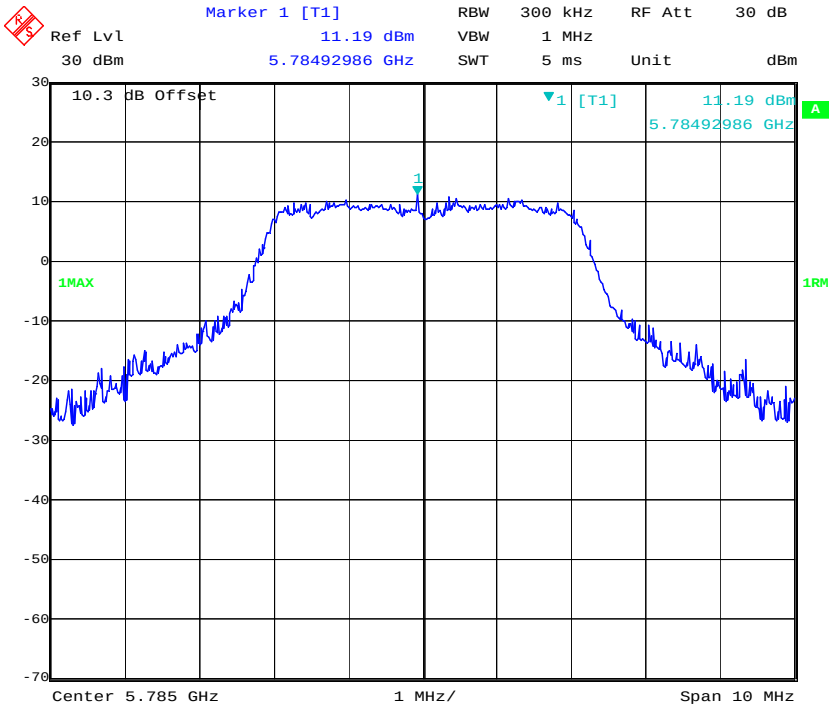
Date: 27.FEB.2017 21:42:10

5M Low Channel



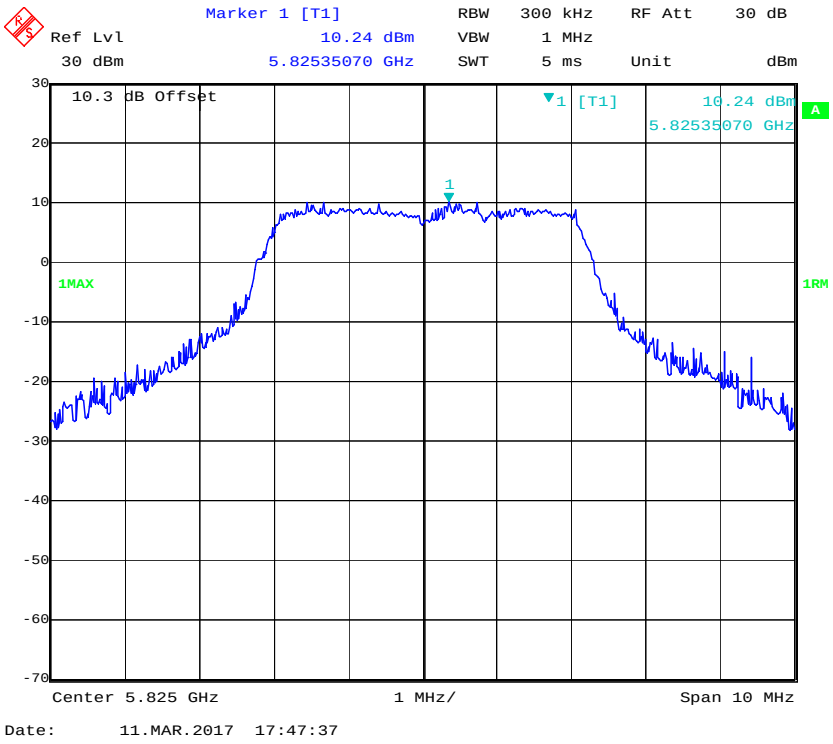
Date: 11.MAR.2017 17:13:29

5M Middle Channel



Date: 11.MAR.2017 17:18:24

5M High Channel



***** *END OF REPORT* *****